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TITLE:

Tourism Impact on Environmental Sustainability in the Context of Wildlife Watching Tourism in Protected Areas

: A Study of Elephant Watching Tourism in Udawalawe National Park, Sri Lanka

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ABSTRACT

Tourism in natural areas continues to grow. Consequently, the concerns for impact of tourism on environmental sustainability also grow. Wildlife is an important element of natural environment as well as a main attraction and resource for tourism. Non-consumptive uses of wildlife such as wildlife watching in protected areas have become a very popular nature based tourism sector worldwide. This study aimed to examine tourism disturbance on wildlife, which is one of the main concerns for environmental sustainability associated with wildlife watching tourism in many protected areas worldwide.

Studies related to tourism disturbance on wildlife in protected areas are mainly focused on behavioral dimensions of wildlife. Human dimensions of wildlife such as tourist behavior and tourist activities have not been revealed together. Consequently, the result of these studies can only show whether there is a disturbance due to tourism or not, and cannot specify what aspects of tourism is leading to disturbance. Therefore, this study examines both wildlife and tourism aspects simultaneously in identifying tourism disturbance on wildlife and discussing ways to mitigate such impacts. The study is based on elephant watching tourism in a famous national park in Sri Lanka.

Two approaches were taken in the study in revealing tourism disturbance on wildlife. First approach aimed to identify the characteristics, wildlife values and behavior of tourists and to discuss their impact on wildlife. Tourist characteristics were revealed based on a concept called recreational specialization. Wildlife values were assessed based on a wildlife value orientation scale. Direct observations were conducted to examine tourist behavior during the tours. It is often assumed that people who participate in non-consumptive wildlife tourism such as wildlife watching are environmental sensitive and supportive of conservational efforts. However, the results of this study showed that most tourists to a natural park on elephant viewing were novices with no or less experience and orientation towards wildlife. As a result, they tended to behave disruptively to wildlife during the tours. Therefore, identification of tourists in terms of their specialization in the activity and their values provides important implications for the park management in finding ways to influence tourist behavior to encourage minimal

impacts on wildlife. The second approach of the study aimed to identify how wildlife responds to tourists and to discuss possible causes of disturbance. Focal animal sampling method was used in the behavioral observation of elephants along with individual recognition. Four types of behavioral responses of elephants (alert, fear, stress and aggression) were observed as indicators of disturbance on elephants' feeding activity in the presence versus absence of tourists. The frequency and the durations of the four responses were significantly high in the presence of tourists compared to the absence of tourists. Certain differences in the way of responding could also be identified among different age-sex-group classes of elephants. Tourist disruptive behaviors such as talking during the tours, close distances when watching elephants, vehicle activity, and the time of the tours were found significant in causing disturbance to elephants, among which tourist disruptive behaviors and vehicle activity were the most influential factors leading to disturbance. Elephants are one of the most attractive wildlife for tourism. At the same time, elephants are one of the most endangered wildlife in the world. Therefore, it is important to mitigate tourism disturbance to wild elephants by adopting calm behaviors, controlled vehicle activity and also appropriate distances and time during the elephant watching tours for the benefit of both tourism and conservation.

Countries with high level of biodiversity, such as Sri Lanka, are popular wildlife tourist destinations. While tourism provides revenue and contributes significantly to the country's economy, increasing pressure of tourism on the natural environment and wildlife tends to be critical. Therefore, non-consumptive wildlife tourism such as wildlife watching, which is often assumed as harmless and an environmental friendly tourism suitable for protected areas, can also become detrimental on wildlife if managed poorly. Comparison of human dimensions of wildlife such as tourist characteristics, wildlife values and behavior along with the behavioral dimensions of wildlife provides important insight to the problem and implications for park management in wildlife areas. Protected areas focusing on wildlife for tourism should monitor behavioral responses of wildlife in relation to tourism activities as a mean of identifying measures to reduce tourism disturbance on wildlife. Further, the role of interpretation and guide systems in mitigating tourism disturbance on wildlife is also highlighted in this study.

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I. Introduction

Protected areas have been very attractive settings and resources for tourism. “The link between protected areas and tourism is as old as the history of protected areas” (Eagles et al. 2002). “The relationship of tourism to conservation can take forms of ‘conflict’, where tourism has adverse effects on the environment or ‘coexistence’, where tourism has no impact on the area in which it operates or ‘symbiosis’, where conservation values are enhanced by tourism” (Lindsay et al. 2008). However, in general “all forms of tourism have impacts on natural environment” (Buckley 2004). Therefore, “the challenge of protected area management is to create a relationship between tourism and conservation that ensures ‘conflict’ is always less than the compensating ‘symbiosis’ so that both ventures will be sustainable” (Lindsay et al. 2008).

Table 1-1 shows the types of protected areas as classified by IUCN management categories. National parks cover the highest proportion among the six categories in terms of land area. “A significant amount of the world’s most significant biodiversity conservation sites is located in Category I and II sites” (Eagles et al. 2001). Nature based tourism is highly dependent on the quality of natural environment. Consequently, protected areas have been the main settings and resources for nature based tourism worldwide, especially national park is closely associated with nature-based tourism, being a symbol of a high quality natural environment with a well-designed tourist infrastructure (Eagles et al. 2001). The recent increase and expansion in this segment of tourism has led to a greater use of parks and other protected areas by people (Boyle & Samson 1985, Papouchis et al. 2001, Eagles et al. 2001). As a result, various negative impacts on environment sustainability (The term environment sustainability is used in this paper with the meaning of ensuring the natural values of the area and protecting such values for future generations) of protected areas have occurred. Therefore, consumptive uses of natural environment for tourism have been prohibited or restricted in many protected areas while non-consumptive forms of tourism have been recommended as an alternative (Blanc et al. 2006). With the expansion of nature based

tourism in many parts of the world, there is a growing concern that the non consumptive uses for tourism can also have detrimental effects on the natural environment (Knight and Cole 1995).

Wildlife is the main tourism attraction in natural parks in many countries. For example, wildlife is the number one tourism resource in national parks in Australia (Eagles et al. 2002). Many parks encourage non-consumptive uses of wildlife for tourism such as observing and taking photographs in which wildlife is not permanently removed or killed. This type of tourism is called "wildlife watching tourism". It is different from viewing animals in a captive environment (such as a zoo) because tourists have to visit the natural areas where animals actually exist and animals are not brought to where people live. Wildlife watching tourism is chosen by protected areas for its non-consumptive nature and with the aim to foster a symbiosis relationship between conservation and tourism. In the past, non-consumptive wildlife tourism has been considered relatively harmless in terms of its effects on wildlife. However, there is growing concern that activities such as wildlife viewing, photography, and even the simple act of walking through an animal's territory, can have serious negative impacts on wildlife (Knight & Cole, 1995). These impacts may be easily noticeable such as habitat modification or can be very subtle such as disturbance on wildlife (Beale 2007, Taylor and Knight 2003). Many wildlife face habitat changes linked with tourism activities and these potential threats have already been well documented and many protected areas aim at reducing their impact (e.g. Madsen and Fox 1995, Madsen et al. 1998). However, disturbance induced by non-consumptive tourism like wildlife watching has long been neglected (Blanc et al., 2006). "Tourism induced disturbance is increasingly becoming a concern to environmental sustainability" (Wight 2002) and "in the current context of rapid increase of these activities, it seems essential to quantify their effects on wildlife" (Blanc et al. 2006). Therefore, this study focuses on tourism disturbance on wildlife in discussing the impacts of tourism on environmental sustainability in protected areas.

"Disturbance is any deviation from normal behavior in response to unexpected occurrences in the vicinity of animals" (Beale, 2007). Changes in animal behavior are the most obvious consequences of human activities, also the easiest to detect in understanding impacts (Constantine et al. 2004, Dyck and Baydack 2004). "The reaction of an animal to a potential disturbance is the result of a complex trade-off

between many factors acting at various levels, from the propagation or perception of the disturbance to its interpretation by the animal, and its choice to respond to it or not" (Beale 2008). Among these factors are "the individual paradigm and characters, genetic, behavioral (Shy or not), physiological (body-condition, stress hormones), social (dominant or subordinate), historical and secondly the environmental conditions such as refuge availability, climate conditions, etc." (Blanc et al. 2006).

Table 2 includes some examples for studies on tourism disturbance on different wildlife species based on the behavioral responses of wildlife. For example, Constantine et al. (2004) observed five behavior patterns of bottlenose dolphins in the presence of tourist boats for one year and found out decreased resting, forage, social behaviors in dolphin schools due to tourist activities. Dyck and Baydack (2004) revealed the vigilance behavior of different age, sex classes of Polar bears in the presence of tourist vehicles in Churchill, Canada and found out that the vigilance clearly increased in the presence of tourists compared to absence of tourists. They also found out that the male and female bears reacted differently to tourist vehicles. Some studies use experimental approaches trying to standardize the disturbance event and the same observer walks towards the animals to measure behavior (Lords et al. 2001). "The response of wildlife to tourism disturbance is complex, being neither uniform nor consistent as different species of wildlife have different tolerances for interactions with humans. Even within a species, tolerance levels for interactions will vary by time of year, breeding season, animal age, habitat type, and individual animal experience with tourists" (Blanc et al. 2006). Seasonal and spatial effects appear to be strongly tied to habitat requirements and utilization (Anderson 1995). For example, if a species is already under physiological stress from limited food and other environment factors, interaction with humans may be especially serious (Blanc et al. 2006). Previous studies on tourism disturbance are mainly focused on wildlife behavioral aspects, and most of them lack analysis on tourism aspects such as types of tourists, tourist behavior or tourist activities during wildlife watching (Table 1-2). One of the fundamental components, and the primary source of disturbance, is people. People, or more specifically, tourists, hold a wide variety of values, beliefs, and expectations regarding wildlife, recreation and other natural components (Cline et al., 2007). Most people practicing in tourism activities do not think their

activities can affect wildlife (Taylor and Knight 2003). People do not feel responsible for causing disturbance, as soon as they have adhered to the instructions they were given (Klein 1993). Natural habitat managers themselves are not always conscious they can be sources of disturbance (Farrell and Runyan 1991). "A combination of sociological and biological data on recreation impact is vital for an informed decision" (Manfredo et al. 1995).

Research about tourism disturbance is numerous and focuses on various wildlife species (Buckley 2004). However, in many studies, comparison of the aspects of tourism such as tourists, tourism activities and the background or the context in which tourism occurs have not been conducted along with the wildlife behavior as factors causing disturbances. Thus, tourism is considered detrimental as a whole. Consequently, the result of these studies only show whether there was disturbance due to tourism or not, and do not specify what aspects of tourism is leading to disturbance. Further, studies on tourism impact on wildlife can be divided into two categories: one focusing on wildlife behavior and the other on the tourism aspects. For example, Dyck and Baydack (2004) and Lemelin et al. (2008) revealed tourism impact on polar bears in the context of polar bear viewing in Churchill, Canada. The first study revealed the behavioral changes of polar bears due to tourism and the latter revealed type of tourists to identify possible impact on polar bears. The first study in this example revealed only the differences in behavior of polar bears in the presence versus absence of tourists. The second study analyzing the characteristics of tourists could only provide indications of a high potential of tourism disturbance on polar bears. The actual causes of disturbance related to tourism (whether it was tourist behavior, whether it was tourist vehicle activity etc.) were not clear in the results of both studies. The current study attempted to fulfill the gap between these two categories of tourism disturbance studies by combining the two approaches and aimed to contribute to park management and tourism planners in shaping their planning process in terms of conservation and tourism development by

- Identifying the characteristics of tourists who participate in wildlife watching tourism (such as their specialization in wildlife watching, their wildlife values and orientation towards wildlife) and their behavior during the wildlife watching tours. A questionnaire survey (based on two

concepts called “recreation specialization” and “wildlife values”) and direct observations of tourist behavior were used in this purpose (a detailed description is given in chapter 3).

- Identifying how wildlife react (behavioral responses such as increased alert, aggression, stress, fear) to tourists, tourist behavior and to tourist activities. A sampling method called focal animal sampling was used to observe wildlife behavior (a detailed description is given in chapter 4).
- And determining the significant association between tourist behavior/activities and wildlife behavior (see statistical analysis in chapter 4 and 5).

This study attempts to cover one of the unrevealing areas of tourism disturbance studies, which is linking human dimension of wildlife with wildlife behavioral dimensions to humans. Therefore, this paper includes not only the analysis of wildlife behavioral changes to tourism, but also analysis on different types of tourists who utilize protected areas on non-consumptive basis, their concerns about wildlife and their behavior during the tours to provide insights to the problem and imply mitigation methods.

The study is based on elephant watching tourism in protected areas in Sri Lanka, because Sri Lanka is recognized as the best place to view elephants in the wild in the world providing opportunities to observe large number of elephant herds at any given time of the year (World bank 2010). Sri Lanka is also recognized as the country with the highest biodiversity per unit area in Asia, and identified as a biodiversity hotspot in the world by scientists and especially famous for its unique subspecies of Asian elephant population (Mittermeire et al. 1999). To qualify as a hotspot, a region must meet two strict criteria: it must contain at least 0.5 percent or 1,500 species of vascular plants as endemics, and it has to have lost at least 70 percent of its primary vegetation (World bank 2010). Sri Lanka maintains a similar network of protected areas as IUCN management categories stated in table 1-1. Consumptive forms of wildlife tourism or human activities are not allowed in protected areas in the country except wildlife watching, which is the main tourism activity in many national parks and sanctuaries. There were fluctuations in tourism in the country until 2009 as a result of an internal conflict. However, there has been a fast recovery and a significant increase in tourist arrivals as well as a rapid development of overall tourism from 2009 (see chapter 3). Human-elephant conflict is a serious issue in Sri Lanka in which

agrarian communities conflict with wild elephants for land and other resources (Ranaweerage, 2012). Protected areas therefore become important habitats for elephants without people living in. Even though there are no communities living within protected areas in Sri Lanka, except sanctuaries, visitation is encouraged as forms of wildlife watching tourism. With the expansion of tourism in Sri Lanka, the pressures on wildlife has also become a serious concern, especially elephants being already in conflict with humans can easily suffer from disturbance from tourism in their important habitat areas. Therefore, this study used case studies from Sri Lanka in discussing environment sustainability issues in protected areas in the context of non-consumptive wildlife tourism.

Table 1-1 Number of global protected areas and the land area

	Protected areas globally			
IUCN category	Number	Percent	Total area in Km2	Percent
Ia. Nature reserve	4,395	14	982,487	7
Ib. Wilderness	806	3	940,344	7
II. Nature Park	3,386	11	4,000,825	30
III. Natural Monument	2,122	7	193,022	1
IV. Habitat Area	11,171	37	2,460,283	19
V. Protected Landscape	5,584	18	1,067,118	8
VI. Resource Management	2,897	10	3,601,447	27

(Source: Eagles et al. 2001)

Table 1-2 Some examples of tourism disturbance research on various wildlife species

Title	Methods	Results	Remarks
Dolphin-watching tour boats change bottlenose dolphin (*Tursiops truncates) behavior* in Bay of Islands, New Zealand (Constantine et al. 2004)	Boat based observations of dolphin behaviors (Instaneous and Scan sampling) such as social, forage, rest, slow travel, travel, fast travel and mill in the presence of tourist boats vs. research boat. One school was observed per day. About 3 months study	Observation of 55 focal schools Significant difference of dolphin behavior was found in the presence of research boat vs. tourist boats, and the behavior was also influenced by the number of boats, type of boat, dolphin school size, the departure time of the boats	Tourist behavior was not considered as a disturbance factor Research boat was maintained at a 50m distance for observations and research boat was also considered as a point of disturbance.
Effects of tourist activities on ungulate behavior in a mountain protected area (Pelletier 2006)	Road surveys and counting of groups of four ungulate species seen in areas within the sight of roads during weekdays (low traffic volume) and weekends (high volume), Observation of reactions of Big horn sheep to domestic dogs vs. natural predators 2 year road survey, 6 months behavioral observation of Big horn sheep	78 road surveys. High traffic volume decreased ungulate use of habitat areas within sight of the road. Big horn sheep ran longer distances when encountered domestic dogs compared to encounters of natural predators.	The effects are discussed mainly based on the number of vehicles.
Asian Rhinos, *Rhinoceros unicornis* on the run? Impact of tourist visits on one population. Chitwan national park in Nepal (Lott and MacCoy 1995)	Observation of individually recognized Rhinos (one-zero sampling) from an observation tower and elephant-borne spotting comparing the rhino behavior (alert, walking, feeding) before, during and after elephant-borne tourist visits, proximity from elephant-borne tourists were also analyzed 17 study days	14 individually identified rhinos During the visits, the rhinos spent more time on alert and less time feeding. Close approaches (especially those under 10 m) were more disruptive as feeding rates decreased while alerts & walking increased	In this park, tourists watch rhinos on elephant rides. Causes of disturbance for rhinos could be either elephants or tourists on elephants or behaviors of both. These differentiations were not given.
Vigilance behavior of polar bears (Ursus maritimus) in the contextof wildlife-viewing activities at Churchill, Manitoba, (Dyck and Baydack 2004)	Vigilance behavior is recognized as a indicator of disturbance on resting bears. Observation of vigilance behavior of resting Polar bears in the presence vs. absence of tourist vehicles from an observation tower and by a vehicle. (Focal animal sampling) 1.5 months study	43 individually identified bears Increase in vigilance in the presence of tourist vehicles compared to absence of tourist vehicles in male bears but not in females. It was assumed that female bears use tourist vehicles as a safety buffer to protect their off spring from male bears	Sample size for female bears was small Distances between vehicles and bears, vehicle activity in the immediate vicinity of a bear during viewing, and noise of tourists were not considered
Responses of woodland caribou to winter ecotourism in the Charlevoix Biosphere Reserve, Canada (Duchesne et al. 2000)	Observation of 6 types of caribou behaviors- vigilance, foraging, resting, standing, walking and other (Scan sampling) and Compare the behaviors during and after visits with their behavior during days without visits about 3 months study	58 different age-sex classes of caribou In the presence of tourists, caribou increased time spent vigilant and standing, mostly at the expense of time spent resting and foraging. After visits, caribou tended to rest more . Caribou reduced timespent foraging during ecotourist visits as the number of observers increased. The impact of tourists appeared to decrease with the progress of winter and visits were short	All visits to the caribou area were in the form of organized tours led by naturalists. Only the number of tourists and the distance were taken as disturbance factors

Responses of Chimpanzees to habituation and tourism in the forest Kibale, Uganda (Johns 1996)	Record chimpanzees' initial reactions such as flight, charge, approach and wait for another, stealthy retreat, loud vocalisation, softvocalisation, hide, curiosity, ignore to contacts with tourists together with other factors such as numbers of tourists present, distance from tourists to chimpanzees, habitat type and the method used to locate the chimpanzees. 1.4 years	Habituation over time could be seen in males, whereas there was no significant in females. Distance to the tourist had a great significant as animals encountered at a distance of between 10 and 20 m either fled or charged. When the animals feed on plants, they were more likely to react with flight or charge than when they were resting. The way the chimpanzees are located also had an effect on their reaction. Numbers of observers, the chimpanzees' party size and the density of vegetation did not have an impact on the chimpanzees' reaction	Differences of age categories of chimpanzees were not measured Tourist behavior when observing was not considered
Water bird behavioral responses to human disturbances (Klein 1993)	Compared visitor behavior such "stop vehicle within the sight of bird, but do not get out", "get out of the vehicle, but do not approach", "get out and slowly approach" etc. with responses of birds such as "bird look up", "gave alarm call", "slowly moved away", "quickly move away" or "no observable response" 15 species of birds 1 year period	As intensity of disturbance increased, avoidance response by the birds tended to increase responses was also related to the type of disturbance For example, Most species were sensitive to approaches on foot	A method of an experimental disturbance was used Visitors and their purpose of visit were categorized based on visitor activities e.g. Photographers were defined as having a 35-mm camera or more sophisticated equipment and spending -50% of their time photographing wildlife
Behavioral responses of Dingoes in Fraser Island, Australia (Lawrence and Higginbottom 2002)	Incident survey to rangers to find out whether different characteristics of dingoes such as age and gender and people such as group size and behavior affected the aggressive behaviors of Dingoes. Observations of dingoes in the field on foot and by vehicle in environments with high and low levels of human use. (continuous sampling for 14 days) Sequence sampling to compare tourist behavior (run, walk, submission and aggression) as a form of experiment and Dingo behavior 2 months study	63 individually identified Dingoes No difference in the time spent in different states in different environments. But there was a significant interaction between event and environment type as frequency of events in areas of high levelof human use was high compared to areas of low human use Dingo responses were significantly related to human behaviors and influenced by the presence of tourists	Unable to collect any Incident surveys were not done rangers during the study period Small sample size Human behavior was observed based on an experiment and not on real situation

II. Classification of wildlife watching tourism in protected areas, its importance and issues

This chapter distinguishes wildlife watching tourism from other types of wildlife based tourism, and discusses its positive and negative impacts in protected areas by referring to numerous literature and case studies in protected areas from different parts of the world.

1. Classification of wildlife watching tourism in protected areas

Many people today travel to connect with nature. “Getting close to animals is an extremely popular mechanism whereby tourists can feel they are communing with nature” (Orams 2002). “For many tourists wild animals are of particular interest compared with other elements of the natural environment” (Higginbottom 2004). This interest is described as a reflection of the historical perspective of human-animal relations, the fact that animals have been the companions of humans for millennia (Higginbottom 2004, Oram 2002, Reynolds and Braithwaite 2001). With this historical background, it is also seen as a result of increased demand for experiencing encounters with wild animals due to the lack of opportunity to see or interact with wild animals in day today life as in the past (Jenner & Smith 1992). As a result, today, many countries use wildlife as flagships for promoting tourism in general or nature based tourism (Higginbottom 2004) and wildlife is the major motivation for tourism in many countries (Shackley 1996).

Tourism focusing on tourists’ interaction with wild animals offers diverse types of experiences. Such tourism experiences include consumptive uses of wild animals such as killing, capturing or utilizing animals. On the other hand, it also involves non-consumptive uses of wild animals such as observation, photography or feeding of animals. The types of experiences can take place in natural environment or in manmade environment (Burns & Sofield 2001). As a tourism product category, “any tourist activity having wildlife as its primary focus of attraction” is called wildlife tourism (Duffus & Dearden 1990). Wildlife is a general term that represents both flora and fauna. However, in this definition of wildlife tourism, wildlife refers only to animals in the wild, as it is the most common use of the term in tourism industry. Therefore, the term wildlife is restricted to wild animals throughout this paper. Wildlife for many people is a large mammal or a flock of wild birds (Tapper 2006), but in tourism sector, the term is

widely used to cover all types of animals from land dwelling vertebrates and aquatic vertebrates to invertebrates such as glow-worms, butterflies, corals and starfish. “Wildlife is not restricted to animals that are native to countries such as kangaroos in Australia but also includes exotic animals, whether held in captivity, or introduced into the natural environment either deliberately or accidentally such as feral pigs and camels in Australia” (Higginbottom 2004). As shown in the Fig. 1 wildlife tourism overlaps with other types of tourism such as nature based tourism, rural tourism and especially with eco tourism. Newsome et al. (2005) states wildlife tourism is partly adventure travel, generally nature-based and includes key principals of ecotourism of being sustainable, educative and supportive to conservation. Some authors use ecotourism as a synonym for wildlife tourism (Buckley 2004, Tisdell 2003). Therefore, wildlife tourism is divided into four subsets; hunting tourism, fishing tourism, zoo tourism (or captive wildlife tourism) and wildlife watching (also called wildlife-viewing tourism) to be more specific in its contents and focuses.

Wildlife watching tourism, a subset of wildlife tourism focuses on watching free ranging animals in the natural environment (Higginbottom 2004, Buckley 2004, Knight 2009, Tapper 2006). Natural environmental distinctions include marine, terrestrial, coastal areas and specific habitat types (e.g. wetlands, rivers, rainforests, savannah, mountains, deserts, coral reefs, pelagic areas) and species that are watched are of a large range (Higginbottom 2004). For example, Monarch butterfly viewing in Mexico, Glow worm viewing at Springbrook National park in Australia, observing komodo dragons in Indonesia, observing snakes in Bharatpur in India, observing firefly in Malaysia, observing crocodiles in Black river Jamaica, Birdwatching in Bempton cliffs, UK, seeing breeding albatross colony at Tiaroa Head New Zealand, Observing Penguins and penguin colonies in Antarctica or in Phillip Island in Australia, vehicle safaris to see large mammals at Serengeti National Park in Tanzania and Masai Mara in Kenya, Observing Gorillas at Bwindi National Park in Uganda, Polar bear viewing in Churchill, Canada, observing bats in Texas, USA, observing dolphins in Red sea, Egypt and whale watching in Península Valdés, Argentina show the wide range of species used in wildlife watching tourism (Newsome et al. 2004). Much wildlife watching tourism takes place in protected areas that are rich in wildlife (Ceballos-

Lascurain 1996). The essential feature of wildlife watching is that it involves humans going to where the animals are, as opposed to a city zoo, which involves the animals brought to where humans are (Knight 2009). “Watching wildlife is essentially an observational activity, although in some cases it can involve interactions with the animals being watched, such as touching or feeding them” (Orams 2002).

Although hunting animals for sport has existed for thousands of years, the idea of visiting and observing of wildlife in the natural environment for recreational purposes, as a tourist attraction, is a relatively recent phenomenon (Hoyt 2001, Mvulva 2001, Orams 1996, Leader-Williams and Clayton 1997, Reynolds and Braithwaite 2001, Wilson and Tisdell 2001). Wildlife tourism developed rapidly after Second World War in the form of wildlife viewing in national parks and game refuge on government or state-owned land (Sinha 2001). Today, wildlife watching has become very popular worldwide with the number of participants steadily increasing (Reynolds and Braithwaite 2001). The International Ecotourism Society (1998) has estimated that 20% to 40% of all international tourists have an interest in some form of wildlife watching. In recent years, a number of organizations and initiatives have been established to focus particularly on viewing of free-ranging wildlife. For example, the national watchable wildlife program and state wildlife viewing programs in the USA (Pierce and Manfredo 1997, USDA Forest Service 2003). Subsequently, wildlife viewing guidebooks, manuals and videos for tourists is appearing. State wildlife viewing guides and professional wildlife viewing manuals such as “Providing Positive Wildlife Viewing Experiences” and “Everyone's Nature” from Watchable Wildlife, Inc. are some examples. Further, businesses have been established to supply goods to support wildlife watching (e.g. Wildlife Watching Supplies 2012).

The world’s population has doubled over the past 40 years; the area of wildlife habitat given legal protection has almost tripled, and now amounts to nearly 12% of the land surface of the planet (Higginbottom 2004). Many countries manage networks of natural areas where wildlife is protected by law, but that allow and promote their observation by tourists (Shackley 1996). Thus, range of opportunities for tourists to interact with wildlife mainly occurs in protected areas (Ceballos-Lascurain 1996). As shown in the examples of wildlife watching tourism, which is dependent on high level of

wildlife quality often takes place in protected areas focusing on wildlife conservation. Wildlife tourism is often thought of in the context of legally protected areas set aside both for conservation purposes and for economic development (Giongo et al. 1993). The establishment of many protected area networks in both developed and developing countries has seldom been determined by nature conservation priorities alone (Leader-Williams et al. 1990). The trend of developing tourism in more natural settings continues, and protected areas are obviously among the prime attractions for tourists (Giongo et al. 1993). The United States National Parks System continues as the largest tourist attraction in the world (WTO and UNEP 1992) while Australia's Great Barrier Reef is one of the best known national parks with around 0.5 million visitors a year (Jenner and Smith 1992). National parks are the most common and well-known type of protected area but there are other categories designated by IUCN that cover a range of management objectives and levels of use. Thus, non-consumptive tourist activities may be offered in protected areas with high levels of protection, while consumptive tourist activities may be offered in protected areas in lower categories of protection. Protected areas are the best sites for wildlife watching tourism since they offer some guarantee of maintaining their attractions in the long term through a strong legislative regime (Roe et al. 1997).

Thus, wildlife watching tourism is a form of nature based tourism that focuses on non-consumptive aspects of wildlife providing an opportunity for people to experience and enjoy wildlife in the actual habitats. This type of tourism is expanding all over the world, especially in protected areas of high conservational values of wildlife. The definitions of wildlife watching tourism overlaps with other forms of nature based tourism especially with ecotourism or it is generalized as wildlife tourism. Consequently, there is limited data directly on wildlife watching tourism worldwide and the sector is larger than represented by such data.

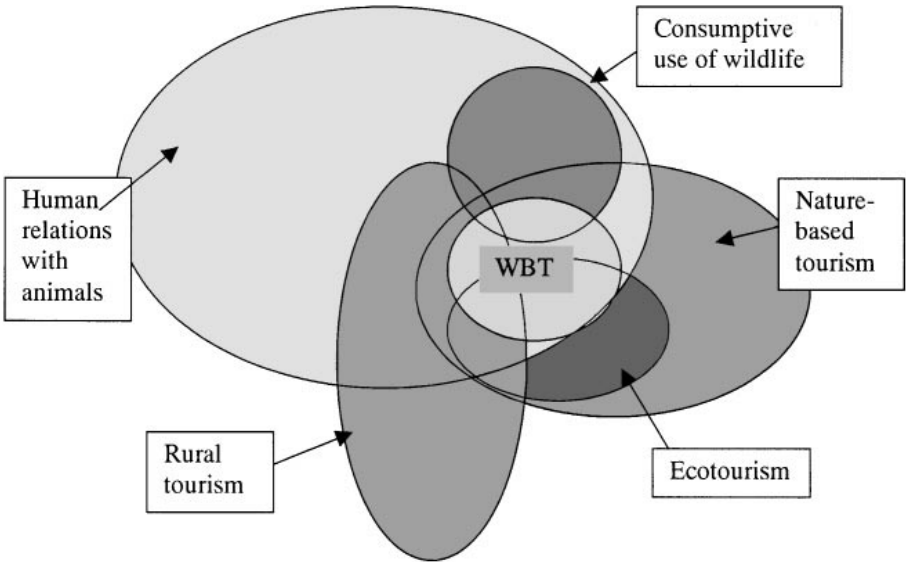


Fig. 2-1 Relationship of wildlife-based tourism with other types of tourism
(Source: Reynolds and Braithwaite 2001)

2. Importance of wildlife watching tourism

Continuous development and expansion of wildlife watching tourism throughout the world is reasoned by its high economic, conservational and social importance to the world (Ballantyne et al. 2009). As shown in table 2-1, wildlife watching is a valuable economic asset for many countries. Economic value of wildlife-viewing tourism includes direct economic effects such as income from entry fees, camping fees, and other charges levied on visitors, the allocation of government revenues, sales of services and products at the site, donations by visitors and sales of concessions to others to provide products or services at the site e.g. accommodation, food and tours (Tisdell 2003) as well as indirect economic benefits that are generated as a result of direct expenditures on wildlife watching tourism such as the stimulation of supporting economic activities, promotion of tourism to a country or region, and the value of environmental services that are protected as a result of the incentives that wildlife watching tourism provides for conservation (Tapper 2006). For example, in USA, in one year wildlife watchers alone spent US $2.6 billion on cameras and other photographic gear and spent US$507 million on binoculars and spotting scopes (Caudill 2003). Estimates of the indirect economic effects of wildlife

watching generally find that these effects are at least equal to and often exceed the value of direct effects in terms of both income and employment generation (Tapper 2006, Tisdell 2003).

As described above, economic value associated with wildlife watching tourism is large. There is therefore a huge potential for some of the revenues generated through wildlife watching tourism to be used to contribute to conservation of the watched species and the maintenance of natural resources of the protected area (Tapper 2006). Evidence of the wildlife watching tourism's contribution to conservation can be found from many wildlife watching destinations worldwide. For example, conservationists set up crocodile watching safaris on the Black River in Jamaica to protect the crocodile population, which was threatened by poaching (Tapper 2006). In the Galapagos Islands and Bunaken National Marine Park, wildlife watching tourism provides all or most of the annual budget for park management, including the costs of managing tourism (Tapper 2006). In the Seychelles, whale shark watching is used to raise the funds needed for monitoring and research for whale shark conservation (Tapper 2006). At the same time, the increasing demand to watch wildlife in the natural environment has motivated the wildlife watching tourism operators to directly participate in wildlife conservation and protecting watched wildlife as a tourism resource. Phillip Island Penguin Reserve in Australia, run by a government-appointed board, hosts one of Australia's most popular wildlife attractions, the daily 'Penguin Parade', involving close-up viewing of large numbers of penguins making their daily walk from the sea to their burrows. The Reserve's Committee of Management has collaborated with other researchers to oversee and help fund a large body of research and monitoring of the Little Penguin (Rowley 1992, Phillip Island Nature Park Board of Management 1998). This has included counting the numbers of breeding burrows and numbers of adult penguins at the daily 'Penguin Parade' over many years, following concern about population declines in the region (Norman et al. 1992). The Zaire Gorilla Conservation Project, in association with tourism activities, provided surveillance for a large area of a park inhabited by endangered mountain gorillas, with four of the largest families being monitored daily. This has been demonstrated to help reduce poaching of the gorillas (Aveling and Aveling 1989, McNeilage 1996). In Serengeti National Park which is a famous wildlife watching destination in Tanzania, the conservation managers are using

photographs taken by tourists to identify cheetah sightings as part of a long term monitoring program. From 2000 to 2003 a total of 243 tourists have sent in information on 377 sightings covering 758 cheetahs in the Serengeti National Park (Tapper 2006). Some wildlife-watching enterprises donate some of their profits to conservation initiatives, or provide opportunities for their guests to make financial contributions to conservation through donations or sponsorships. For example, Munn (1992) reports that 30-50% of North American and European tourists who visited Manu Biosphere Reserve in Peru made donations of US$50-$100 annually to a local conservation group.

Social importance of wildlife tourism can be described based on its contribution to community development by generating employment, reducing poverty and improving livelihoods of host communities. Wildlife watching tourism often takes place in rural areas and much of world's wildlife exists in developing countries. The growth of the international tourism in these areas or countries is closely linked with wildlife watching activities. UN World Tourism Organization (2004) explains seven ways that wildlife watching tourism can contribute to community development which includes employment of the local people in tourism enterprises, supply of goods and services to tourism enterprises by the local people, direct sales of goods and services to tourists by the local people, establishment and running of tourism enterprises by the local people, tax or levy on tourism income or profits with proceeds benefiting the local people, voluntary giving or support by tourism enterprises or tourists and investment in infrastructure and social services stimulated by tourism also benefiting the local people, directly or through support to other sectors. Wildlife watching tourism can contribute to rural development because wildlife is often most abundant far from major urban development, it has been argued that wildlife tourism can provide a much needed rejuvenation to depressed economies in rural areas (Fennell and Weaver 1997, Goodwin et al. 1998, McCool and Lime 2001). For example, Sea turtle watching in Brazilian coast lines through a project linked with turtle conservation provides direct employment to 1300 local people and provides various training programs such as guides training and surfing courses to young students in the local community. These programs are created to educate people on sea turtle biology, marine conservation and also to train on skills to interact with tourists. Another

social benefit of the program is that it encourages education of local people, as regular school attendance is a condition for participation in training courses. In Kruger National Park, South Africa the foreign visitors have generated some 9000 jobs (Roe et al. 2007). In Rwanda, tourism receipts were US$10 million in 1990, of which 60 per cent was directly attributable to gorilla tourism in the Parc National des Volcans and some of this revenue is used to employ 70 game guards from the surrounding area (Weber 1993). At the same time, watching wildlife in natural environment is also considered as highly influential in increasing knowledge of tourists on wildlife and awareness of the importance of conservation (Duff 1993) and in enhancement of tourism satisfaction from viewing and learning about wildlife, increased understanding of tourism impacts, and support for biodiversity conservation (Sinha 2001).

Table 2-1 Economic Impact of wildlife watching tourism

Region	Economic impact of wildlife watching tourism	Source
North America	Annual economic impact of five major bird-watching sites in the USA of up to US$ 40 million	Kerlinger and Brett (1995)
	In 1998, 4.3 million people engaged in whale watching in the USA with a total expenditure of about US$357 million	Hoyt (2000)
	In 2001, 60 million people 35% of the adult population engaged in bird watching	Chardonnet et al. (2002)
	2001, direct expenditure on wildlife-viewing in the USA was US$ 32 billion	
	In 1996, Canadians spent US$1.3 billion while participating in non-consumptive wildlife-associated recreation	
	Wildlife viewing attracted 526,000 visitors from the USA to Canada and residents in the USA spent US$706.3 million on lodging, food, transportation, user fees, equipment and rentals non-consumptive wildlife use is projected to increase by 61% by 2050	
South America	Each macaw visiting a tourist site in southeastern Peru potentially generates up to US$165,000 in tourist receipts over its lifetime	Munn (1992)
	The total income generated by tourism in the Galapagos Islands was US$32.6 million in 1990 and US$35 million in 1992 attract over 60,000 visitors per year and contribute more than US$100 million to the Ecuadorian economy	Higginbottom (2004)
	More than 75% of tourists to Ecuador are motivated by an interest in wildlife, especially Galapagos Islands	Butler (1991)
	In 1992, 610,093 tourists visited Costa Rica, generating US$42.1 million, Wildlife viewing has become the top source of foreign exchange	Chardonnet et al. (2002)

Africa	Kenya- 943,000 wildlife watching tourists with a revenue of USD 304 million in 2000 Value of elephant viewing in Kenya is US$ 25 million per year Uganda-Bwindi-Impenetrable National Park US$600,000 in park fees from 3,300 visitors of in 1995 Uganda- 151,000 arrivals and receipts of USD 149 million in 2000 Tanzania- 459,000 wildlife watching tourists with a revenue of USD 739 million in 2000 In Tanzania, wildlife tourism generates a global income of about US$570 million a year Selous Game Reserve in Tanzania receives some 5000 wildlife watching tourists annually and the fees earned from game viewing comprised some US$ 34,000 in 1991/92. Rwanda-Mountain gorillas alone provide annual revenue of US$4 million South Africa, by 1997 between 11,400 and 21,200 birdwatchers spent USD 12-26 million annually in the South African economy	Tapper (2006) Barnes et al. (1992) Butynski & Kalina (1998) Chardonnet et al. (2002) Rohs (1991) Groom et al. (1991) Turpie & Ryan (1998)
Asia	"Some national parks in Asia attract as many or more tourists as parks in East Africa" In Sri Lanka, the Yala and Udawalawe National Parks receive 250,000 visitors each year and generate US$0.6 million income In Nepal, during the 1998/1999 season, 105,880 tourists entered the Chitwan Royal National Park and spent US$0.75 million, a high proportion of which was spent on renting elephants (*Elephas maximus*) to approach one-horned rhinos (*Rhinoceros unicornis*), tigers (*Panthera tigris*) and other spectacular wildlife	Chardonnet et al. (2002)
Oceania	In Australia, economic value of wildlife to international tourism in the range AUD$1.8 to AUD$3.5 billion per year, and koalas alone worth about AUD$1.1 billion Commercial tours based on the glow-worm population at Springbrook National Park in SE Queensland generated gross revenue of AUD$4 million for a one-year period In 2005,Philip Island Nature park attracted 626,542 visitors and income of A$8.8 from entrance fee and souvenir sale in 2012, 790,454 visitors $125 million In New Zealand, economic value of whale watching in 2000 of $ 15 million direct income and $ 45-50 million indirect income to local communities from accommodation, transport costs, souvenirs and food. In 2005, an estimated 171,387 tourists participated to humpback whale watching tours offered by some 120 tour operators in the South Pacific including Australia and New Zealand. This activity generated a direct benefit of more than US$6.7 million, and a total economic value of more than US$38.3 million	Fredline and Faulkner 2001 Davis et al. 2001 Phillip Island Nature Parks Annual Report 2004-2005/ 2011-2012 Contantine (1999) Schaffar and Garrigue (2007)

Europe	In the Abruzzes National Park in Italy, which receives 2 million visitors a year on account of its great biodiversity (62 species of mammals, 230 of birds, 16 of reptiles, 12 of amphibians, 16 of fish and 2,000 of invertebrates), and mainly because of the presence of endemic species, such as the brown bear 'marsicano'	Chardonnet et al. (2002)
	In total, 1.12 million trips are made each year to or within Scotland for the primary purpose of viewing wildlife. £276 million is spent on these trips 67.5% of international visitors said that they wanted to see 'native animals' during their visit	Scottish Government social reports (2010)

3. Environmental issues associated with wildlife watching tourism

"It is important that wildlife watching tourism be sustainable, and should protect the wildlife, habitats and communities on which it depends" (Tapper 2006). The UN World Tourism Organization (2004) defines environment sustainability as making optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity. It is critically important that the environmental sustainability of wildlife watching activities be given the highest priority due to the inherent fragility of the resource (Gauthier 1993). "In the past, wildlife watching tourism has been considered relatively harmless in terms of its effects on wildlife compared to other forms of wildlife-based tourism" (Lindsay et al. 2008). However, with the number of participants steadily increasing, there is a high concern that wildlife watching tourism can cause detrimental effects on wildlife (Boyle & Samson 1985, Knight and Gutzwiller 1995, Knight & Cole 1995, Larson 1995). A significant proportion of wildlife tourism focuses on endangered or threatened species (Shackley 1996), and much wildlife watching tourism takes place in protected areas (Ceballos-Lascurain 1996). Because of this, wildlife watching tourism is both a threat and an opportunity to the long-term conservation of these species and areas. Assessment of the environmental impacts of wildlife watching tourism is particularly important since the industry is highly dependent on the natural environment (Roe et al. 1997, Eagles et al. 2001). Environmental issues associated with wildlife watching tourism includes indirect impacts such as wildlife habitat damage due to tourism activities, habitat alterations due to construction of roads or tourist facilities, issues related to

environmental pollution and direct impacts such as artificial feeding of wildlife by tourists, transmission of diseases, habituation of wildlife to humans, wildlife death as well as human disturbance on wildlife (Higginbottom 2004, Roe et al. 1997). Each of these impacts is discussed below using examples from different wildlife areas.

- Habitat change or alteration

Wildlife watching tourism can cause changes or damages to wildlife habitats. Clearing of habitat for wildlife tourism such as roads, trails or tourist facilities can result in a change of plant composition (means loss of native plant species and/or the invasion by some exotic plant species), reduced plant production (reduced production of new growth, the level of flowering and fruiting), change plant structure or individual plant characteristics (Cole and Landres 1995) and the end result is a loss of resources used by the native wildlife (Reynolds and Braithwaite 2001). In some wildlife watching areas, habitat change is done purposely to increase the opportunities of wildlife viewing. Roe et al. (1997) provides some examples of such intentional habitat changes including a plan for scrub clearance in Thornybush Game Reserve in South Africa and actual burning of vegetation along the tourist roads in Zimbabwe to facilitate wildlife viewing. Regarding the scrub clearance, a subsequent environment assessment has explained that it would negatively impact on browsers such as giraffe and species that use scrubs to hide from predators such as Kudu and small mammals and birds that use scrub cover for breeding and nesting. Further, infrastructure such as roads and trails in wildlife areas have become barriers to wildlife movement. For example, amphibians are particularly vulnerable when crossing roads during seasonal migrations (Andrews et al. 2008). Roads have been reported as the main factor influencing on grizzly bear habitat and mortality in Yellowstone National park (Weaver et al. 1996). Further, off road vehicles results in erosion (Muthee 1992), and Off road vehicles was found to be a main cause of track length increase in Masai Mara, Kenya (Walpole et al. 2003). Several negative impacts of energy supplies for wildlife tourism such as firewood or electricity supply have been recognized. “The collection of firewood can result in habitat disturbance or degradation and vegetation loss, while power lines produce a visual,

aesthetic impact in the case of overhead lines, as well as impacts associated with vegetation loss where pylons are erected or cables buried" (Roe et al. 2007).

- Pollution

Increased pollution is another environmental issue associated with wildlife watching tourism. Wastewater from hotels and recreational facilities has polluted seas and lakes surrounding tourist attractions, damaging the flora and fauna (Hunter and Green 1995). Turtles in the Galapagos Islands sometimes swallow plastic bags, mistaking them for jellyfish, and may subsequently die (Boo 1990). Large species may pose a direct physical threat to tourists, and have to be shot, while others may cause more indirect hazards. Sewage released into the sea may have implications for coral reefs if algae grow to such an extent as to cover large sections of the reef and prevent the corals from obtaining light and essential nutrients (Edington and Edington 1986).

- Issues associated with souvenirs

Another element of tourism that has great potential to produce negative effects is an increasing market for tourist souvenirs and curios. The growing demand for wildlife souvenirs has also resulted in an increase in the collection of wild plants, corals and shells as well as the illegal capture and killing of wild animals for furs, skins, stuffed animals, ivory, horn, teeth, ostrich eggs, and so on (Roe et al. 2007). For example, in Manuel Antonio National Park, Costa Rica, tourism to view squirrel monkeys has stimulated the revival of the capture of monkeys for sale as pets (Wong and Carrillo 1996). In Galapagos Island, which is a famous wildlife watching destination in the world, coral reefs have been raided for souvenirs (Roe et al. 2007).

- Artificial feeding of wildlife

Artificial feeding of animals by visitors has caused various issues on wildlife. The regular feeding of wild animals can make them much more viewable to tourists than they would otherwise be. Against the background of the unreliability of sightings in the wild, luring wild animals through food provision is attractive for tourists and tourism operators alike because it increases the likelihood of actually sighting the animals (Orams 2002 p. 283). There are many examples of organized human intervention through the

provision of food and water to enhance the viewing of wildlife to tourists. In American national parks, garbage dumps became foraging sites for bears, which attracted large numbers of visitors, who watched the bears as they foraged through the garbage (Schullery 1980), in East African safari parks, carcasses have been used by park staff to attract lions and leopards to particular viewing spots (Edington & Edington, 1986), in Nepal and India, tigers are provisioned with buffaloes in order to expedite tiger-watching for tourists (McDougal 1980); and on the indonesian island of Komodo dead goats were used until 1994 to attract large monitor lizards (or "dragons") for tourists to view and photograph (Walpole 2001). The use of food provisioning is not limited to terrestrial wildlife, but is also used to expedite tourist viewing of aquatic wildlife such as manatees (Shackley 1992), sharks (Orams 2002), and stingrays (Lewis and Newsome 2003). The water holes are another important site in wildlife watching tourism. In East Africa, tourist lodges have been built next to existing water holes in order to expedite tourist viewing of wildlife (Knight 2009), and in other cases an artificial water supply is used (Edington and Edington 1986, Goodwin et al. 1998, Suzuki 2007). The feeding of animals by visitors may produce an imbalanced diet with vitamin and mineral deficiencies decreasing the vitality and survival of animals. When animals are attracted to an artificial food source, for example, the rate of agonistic behavior can increase to artificially high levels with consequent loss of condition and survival. Artificial feeding may disturb normal feeding and social behavior patterns. Artificial feeding by tourists caused a breakdown of the territorial breeding system of land iguanas on South Plaza, in the Galapagos Islands where territories were abandoned in favor of sites where food could be begged from tourists, and this had a negative effect on the breeding success of iguanas (Edington and Edington 1986). Artificial feeding can also result in a complete loss of normal feeding behavior. In the Galapagos Islands, overfeeding by tourists was so extreme that, when stopped, some animals were unable to locate their natural food sources (Boo 1990). Similarly, until the early 1970s, the diet of some grizzly bears in Yellowstone National Park in the USA consisted, to a large extent, of food wastes left by visitors at park refuse sites and when these sites were closed, the bears showed significant decreases in body size, reproductive rate and litter size (Knight and Temple 1995). A film on baboons documented their behavior around wildlife lodge rubbish dumps in

Kenya. Intense competition between the baboons and other dump scavengers such as warthogs, marabou storks and guinea fowl, led to stress and aggression, and changes in baboon behavior. Baboons lost their fear of fire and was often seen rummaging in dump fires. The dumps offered easy access to a rich diet and resulted in the baboons spending less time searching for food and more time at leisure and play. Youngsters had novel toys such as cans, plastic bags and broken mirrors (Roe et al. 2007). Artificial feeding can also affect tourists directly through injuries, and damage to vehicles and campsites, that in turn leads to the destruction of individuals. In Queensland, Australia, dingoes (wild dogs) have become aggressive toward people at Fraser Island National Park. Many consider the feeding of these dingoes as the cause of this aggression (Lawrence and Hinnginbottom 2002). Chimpanzees and baboons in Tanzania (Goodall 1986, Wrangham 1974) were also more aggressive toward people as a result of provisioning. Similarly, a male elephant was shot because it turned cars over to search for oranges in Mana Pools National Park in Zimbabwe (McIvor 1994). Attacks on tourists by crocodiles, hippopotamus and buffalo along the Zambezi River are occurred due to increased familiarity with humans and/or irritation due to their presence (McIvor 1994). There have been cases of large birds, such as Cassowaries in Australia, attacking people for food (Crome and Moore 1990). Thus, wildlife become dependent on artificial feeding and loses their ability or skills to forage on their own (Orams 2002).

- Transmission of diseases

Transmission of diseases from humans to wildlife is also a major problem associated with close contact between tourists and wildlife. For example, direct transmission of disease is a major concern for mountain gorillas, which are highly susceptible to human viruses and bacteria including tuberculosis, measles and pneumonia, all of which could potentially wipe out an entire population be less than five meters (Butynski and Kalina 1998). Six of the habituated female gorillas in Africa died in 1988 because of human-transmitted respiratory illness and among unhabituated gorillas that flee from tourists, diarrhea was found to be a common symptom of stress (Sinha 2001). Concern has also been expressed about the introduction of diseases (such as Newcastle Disease on bird populations through poultry products), to Antarctica as a result of human activities, including tourism (Marsh 1991).

- Habituation of wildlife to tourists

Habituation of animals to tourists has also become an issue in wildlife areas. Habituation is an animal learning not to respond to stimuli such as human presence (Whittaker and Knight 1998). Habituation is not to be confused with tolerance, which is defined as the intensity of disturbance that an individual tolerates without responding in a specified way (Bejder et al. 2009). Habituation is often seen as a desirable outcome in many wildlife areas. For example, wildlife tourism managers may encourage habituation because it increases the ease of observation of animals by making them unnaturally tame to approach by humans and tourism operators often seek to habituate some animals so that they can be closely approached in tourism (Nisbet 2002). The learning process of habituation is a stress in that feeding time is lost and energy is expended in feeing and also habituated animals reduce their vigilance and instinctive fear reactions which can make them more vulnerable to other risks, like natural predators, or to poaching (Boyle and Samson 1985). Increased vulnerability to diseases and loss of wariness to vehicles are some other harmful effects of habituation (Woodford et al. 2002, Stone and Yoshinaga 2000). "The current use of habituation is the general perception that evidence of habituation indicates that a particular disturbance has little or no effect, which may support conclusions that animals are not adversely affected by human activities to which they are considered habituated" (Bejder et al. 2009).

- Wildlife death or injury

Collision with tourist vehicles may kill wildlife accidentally. Tourist traffic in a German national park resulted in heavy losses to a number of species, particularly hares, roe deer and red deer (Mathieson and Wall 1982). Night driving vehicles may also kill wildlife, for example the frequent killing of scrub hares that feed on the short grasses at the road edges in South Africa's Kruger National Park (Edington and Edington 1986). The introduction of harmful concentrations of chemicals into animal habitat by tourism may also cause death or reduce the health of the animal (Reynolds and Braithwaite 2001).

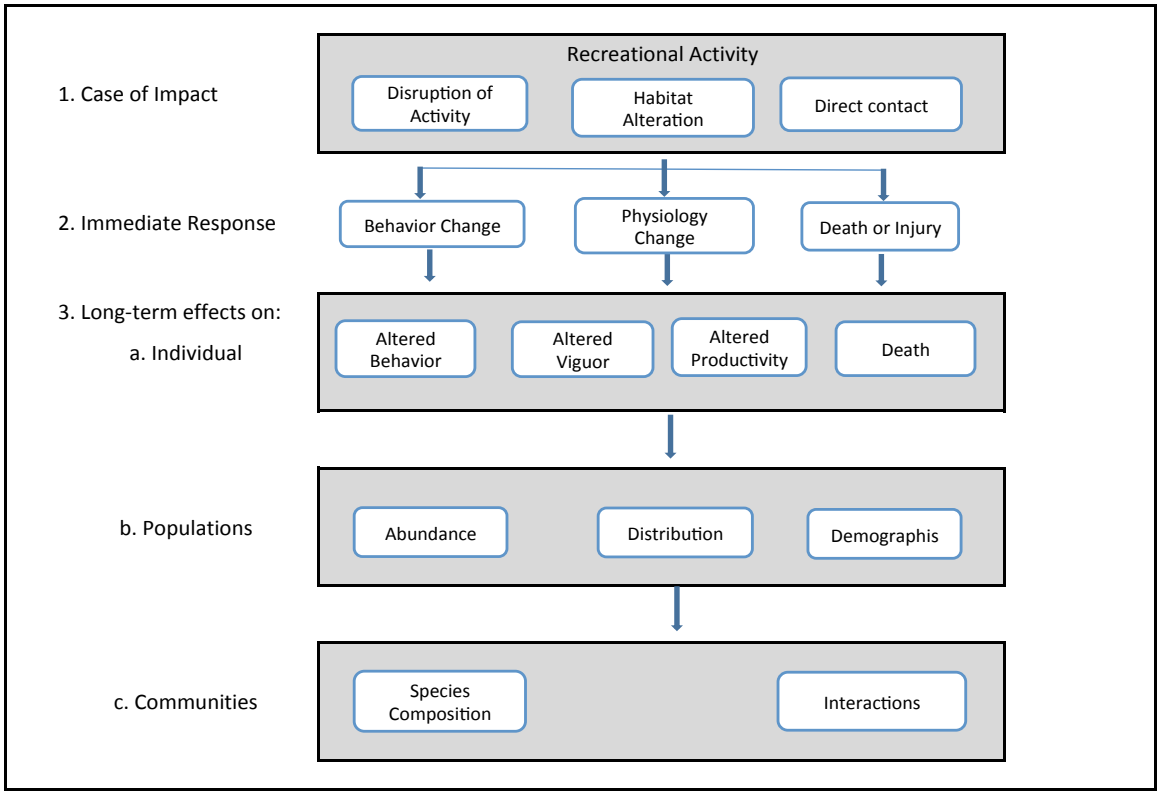
- Tourist disturbance on wildlife

Tourist disturbance on wildlife due to wildlife watching activities has received a growing concern in many protected areas (Giongo et al. 1993, Knight and Cole 1995). Tourist disturbance is reported to be

high when tourist activities occur during sensitive times in the life cycle of wildlife. Albatrosses at Punta Suarez in Galapagos Island have changed the location of their nesting sites away from tourist routes (Roe et al. 2007). Similarly, at Taiaroa Head, New Zealand, tourism was influencing nesting distribution, chick survival and the timing of chick departure from nests of a royal albatross population (Higham 1998). Animals generally only dedicate resources to breeding when they are in good condition. If tourism activities decrease the feeding time and/or increase the energy expenditure due to disturbance from perceived danger, the condition of animals is likely to deteriorate, causing a decline in reproductive success (Reynolds and Braithwaite 2001). Giant otters in Manu National Park in Peru reported to be vulnerable to disturbance since they feed during the day (Roe et al. 2007). In Kenya, a major attraction of wildlife watching tourism is to observe predators such as lions and cheetahs securing a kill, however, the presence of tourist vehicles have prevented cheetahs from hunting (Green and Higginbottom 2001). Tourist disturbance can result in animal emigration and sometimes emigration is a prelude to mortality in that they do not find somewhere else suitable (Reynolds and Braithwaite 2001). If species leave an area or die out, then inevitably the community structure changes, which may negatively impact on the remaining species (Reynolds and Braithwaite 2001). Wildlife watching tourism can also cause disruption to intra-specific relationships (Roe et al. 2007, Lawrance and Hingginbottom 2002). In East Africa, tourist vehicles can separate young ungulates from parents. If separation is prolonged, it can interfere with mutual recognition bonds, parents can reject the young, and there is also a risk of young animals being attacked by predators (Edington and Edington 1986). A similar concern has been expressed over whale watching. Whale calves normally maintain constant body contact with their mothers but, when separated, can transfer their attachment to the side of a boat (Edington and Edington 1986). Increased vulnerability to predators and competitors is also an issue related to tourism disturbance. Individuals that are subject to disturbance will spend less time feeding or resting, and more energy on trying to move away from the source of disturbance, perhaps shifting to more remote or less productive feeding grounds: they may also face greater competition from other species, and be more vulnerable to predation, in these less favored feeding grounds (Reynolds and Braithwaite 2001). Adult birds at the edge of the colony tend to move

away as tourists approach, leaving the nests open to attack (Edington and Edington 1986). In order to conserve the number and diversity of species in tourist locations, it is critical to ensure that populations do not decline as a result of human disturbance (Higginbottom 2004). Figure 2-1 further illustrates the impacts of wildlife to human disturbance.

This section discussed several environmental impacts (both direct and indirect) associated with wildlife watching tourism. If tourism is in direct conflict with conservation, neither is sustainable in the long-term and measures need to be put in place to mitigate the negative impacts of tourism on the local wildlife (Lindsay et al. 2008). In order to do this, information is needed to quantify the effects tourism, so that, if a problem is identified, strategies to mitigate potentially adverse effects can be developed and implemented before irreparable damage is caused to the ecosystem. Such policies facilitate the long-term conservation of wildlife populations and hence the sustainability of wildlife watching tourism activities. However, at present, much of the literature relating to environmental impacts of wildlife tourism is descriptive or anecdotal with little hard data or scientific analysis that actually document the environmental impacts of wildlife tourism (Roe et al. 2007). It is critically important that the environmental sustainability of wildlife based operations be given the highest priority due to the inherent fragility of the resource (Reynolds and Braithwaite 2001).



Source: Green and Hinginbottom 2001

Fig. 2-2: A conceptual model of the responses of wildlife to disturbance

III. Wildlife watching tourism in Sri Lanka

This chapter reveals the status and trends of wildlife watching tourism in Sri Lanka by referring to current tourism strategies and related statistics available from the Government of Sri Lanka, and also discussing the situation of elephant watching tourism in an important and famous wildlife park in Sri Lanka.

1. Tourism trends and the status of wildlife watching tourism in Sri Lanka

"Sri Lanka is part of a region that includes already leading economies such as Japan, Korea, and Singapore and rapidly emerging economies such as India and China, which are capable of altering the economic landscape of the world during the next few decades. Sri Lanka also with its unique geographical location, diversity, quality human resources, peace and stability has all the ingredients in place to play a key role in the regional development as a fast emerging market economy in Asia and the country with a per capita income of USD 2400 in 2010 enjoyed 8% economic growth" (Ministry of Economic Development Sri Lanka 2010). As a result of the post conflict peaceful environment in Sri Lanka from 2009, tourist arrivals grew to 654,476 in 2010 surpassing the previous record of 566,202 in 2004. With this growth trend in tourism, Government of Sri Lanka designed a five-year master plan (for the period of 2011-2016) for tourism development in the country with seven key objectives.

- Increase tourist arrivals from 650,000 in 2010 to 2.5 Million by 2016
- Attract USD 3,000 Million as Foreign Direct Investment to the country within 5 years
- Increase the tourism related employment from 125,000 in 2010 to 500,000 by 2016 and expand tourism based industry and services all island
- Distribute the economic benefits of tourism to a larger cross section of the society and integrate tourism to the real economy
- Increase the foreign exchange earnings from USD 500 Million in 2010 to USD 2.75 Billion by 2016
- Contribute towards improving the global trade and economic linkages of Sri Lanka and

- Position the country as the world's most treasured island for tourism.

The strategies related to these objectives were creating an environment conducive for tourism, attracting the right type of tourists to the country, ensuring that departing tourists are happy, improving domestic tourism and contributing towards improving the global image of Sri Lanka. For example, in attracting tourists and gradually building the arrivals to 2.5 Million and revenue target by the year 2016, business, leisure, shopping and wildlife were identified as products appealing to high spending customers. Sri Lankan government declared 2011 as the visit Sri Lanka year. In the "visit Sri Lanka 2011" campaign, Sri Lanka Tourism focuses on eight product categories including beaches, sports & adventure, Heritage sites, mind and body wellness, scenic beauty, wild life & Nature, people & culture, and festivals. The government has targeted 2.5 million tourists by 2016 and room capacity of about 45,000 to meet this target. This sector is also expected to receive investments in excess of US$ 2 billion in the medium term in areas of luxury hotels, high quality residencies and high-end shopping malls. Based on the five-year plan, further long-term targets are also set (Table 3-1). The sector is expected to attract more than 4 million tourists by 2020, and to be the largest foreign exchange earner in the economy. The sector is also expected to generate employment for about 1 million persons and income amounting to about US$ 8 billion. According to the plan, tourism products will be diversified and high focus will be given on elements of wildlife based tourism products such as elephant safaris, bird watching, dolphin and whale watching and exploring coral reefs because Sri Lanka has a very high degree of species diversity with a high rate of endemism.

As a result of these efforts, tourism in Sri Lanka reached to a new milestone of 855,975 tourist arrivals in 2011, which is an all time high figure in the history of the country (Fig. 3-1). Tourism plays an important role as one of the core Foreign Exchange Earners in the overall economy of Sri Lanka. The foreign exchange earnings increased by 41.4% from Rs. 65,018.00 million (US $ 575.9 million) in 2010 to Rs. 91,926.00 million (US $ 838.9 million) in 2011 and the contribution of tourism to the total foreign exchange earnings increased to 4.3% from 3.8% in 2010 (Sri Lanka Tourism Development Authority 2011). This situation continues to grow with 1,005,605 tourist arrivals in 2012 and 711,446 arrivals in

2013 (up to August), which are about 90,000 arrivals higher compared to the data up to August in 2012. (Sri Lanka Tourism Development Authority 2012 and 2013).

Sri Lanka is a biodiversity hotspot as recognized by scientists and it is arguably the richest country in the world in terms of biodiversity per unit area (Mittermeire et al. 1999). Protected areas of Sri Lanka, especially national parks allow wildlife watching opportunities for tourists. Many domestic and international tourists to Sri Lanka are interested in viewing wildlife, especially elephants, in their natural habitat and as a result of this interest there are many tourists who visit national parks in the country (Buultjens et al. 2005). Not only elephants, Sri Lanka is located on bird migration routes and provides excellent bird watching experiences and also recent discovery of blue whales has opened a new marine wildlife watching experience. Further, the recent master plan for tourism promotes wildlife watching in protected areas and aims to develop revenue from such tourism. Consequently, the number of local and international tourists to wildlife parks and the revenue from park fees has increased significantly in recent years (Fig. 3-2 and Fig. 3-3). This sector is expected to grow further and to achieve US$ 1 million by 2020. Some parks are already facing issues such as overcrowding and pollution due to wildlife watching tourism (Buultjens et al. 2005). Over 480 plant species and 75% of endemic vertebrates in the country are recognized as threatened (Dearden 2009, also see table 3-2). These pressures are more likely to get larger with the fast growth and expansion of the industry.

Elephants are an important attraction for both international and domestic tourists and they are an iconic symbol used in tourism promotions (Buultjens et al. 2005). Sri Lankan elephant (*Elephas maximus maximus*), a subspecies of Asian elephant is one of the most endangered vertebrates (IUCN Red list 2012). Sri Lankan elephants possess distinct genetic differences from the rest of the Asian elephants (Fernando et al. 2003, Gunasekera et al. 2003). Sri Lanka has 10% of Asian elephant population (Perera 2009). The Sri Lankan elephant population at the turn of the 19th century was supposed to be 12,000 (McKay 1973) to 19,500 (Jayewardene 1994) elephants. The elephant population in Sri Lanka has been decreasing since the early 1800s (Bandara and Tidsell 2005) and the currently accepted estimate is fixed at 3,500 (Kariyawasam 2003). Therefore, tourism development and wildlife conservation are equally important to

the country. A survey conducted by World Bank (2010) identified that protected areas in Sri Lanka have a great potential for nature based tourism developments, especially elephant watching tourism can be used to expand financial prospects for conservation as well as economic development. For example, the survey result indicated that foreign tourists to national parks were willing to pay 30% more than the current entrance fee in the current conditions of the national parks and up to 60% more with further improvements. At the same time, local tourists were willing to pay three to four times the current fee in the current and improved park conditions. Box 3-1 summarizes the suggested improvements in each surveyed protected area by world bank (2010). These improvements mainly include diversification of wildlife watching experiences and improving the tourist facilities to attract more tourists and to obtain more funds for conservation of elephants. In the tourism master plan, Sri Lankan government emphasize on the importance of environment sustainability in tourism planning. However, tourism research in Sri Lanka is mainly focused on the economical aspects of tourism (Tisdell 2005, Srinivasan et al. 2012). Some recent studies have documented environmental impacts of wildlife watching tourism in protected areas; however, these studies mainly discuss impacts such as habitat changes or modification of natural environment due to wildlife watching activities (See box 3-2) and impacts such as tourism disturbance on wildlife is not taken into account and yet to be revealed. This delay in research may be due to the internal conflict lasted over the past 30 years and consequent difficulties in conducting studies as well as fluctuation of tourism market due to safety advisories given by various foreign countries in visiting Sri Lanka. After the completion of the conflict in 2009, the tourism is expanding rapidly and the impacts of tourism on the natural environment have become more of a concern. Subtle aspects such as impacts of tourism disturbance on wildlife apart from other relatively noticeable aspects should also be considered in developing an environmentally sustainable tourism.

Table 3-1 Summary of tourism strategies and targets of Sri Lanka

Strategy	Activities	Outcome / Target 2020
Increase Tourist Arrivals	Build positive perception globally through comprehensive market promotion campaigns, increase tourism openness through regional cooperation. Develop major cities of the country to be attractive tourist cities in Asia.	Increase in tourist arrivals up to 4 million per year Increase in tourism earnings up to US $ 8 billion
Promote Up-Scale Tourism	Assure a grand shopping experience for tourist , maintain safety standards and security aspects	Increase in average spending per tourist per day up to US $200
Diversity Tourism	Organize adventure tours prove boat riding, elephant safari, bird watching facilities, improve facilities for exploring magnificent coral reefs, coastal fishing and dolphin and whale watching, promote healthcare tourism , promote agro-tourism, promote community-based tourism	Increase in revenue from visitors visiting wild life parks up to US $ 1 million
Focus on new markets	Focus on new markets such as America, East Asia, Middle East, Eastern Europe and Australasia Establish a state-of-the-art information centre, implement promotion campaigns with the participation of Sri Lankan diaspora and mission abroad , establish overseas market promotion units	Increase in tourist arrivals by regions except Western Europe and South Asia to 60 percent
Develop tourism Infrastructure	Increase accommodation capacity Encourage public-private artnerships	Increase in number of hotel rooms up to 75,000
Popularize Tourist Attraction, Events	Create a data base of tourist attraction and events Publish an event calendar Promote festivals in Sri Lanka	Maximum domestic value Creation

Promote Domestic Tourism	Provide adequate accommodation facilities at affordable rates, build a relaxing environment in main cities, develop all religious places of worship, arrange domestic travel packages, create opportunities to open up internal airlines and sea plane services, promote the setting-up of theme parks	Revenue from domestic visitors visiting wildlife parks, botanical gardens, zoological gardens, museums and the cultural triangle will increase up to US $ 2.5 million
Enhance Industry Professionalism	Encourage private sector to set up world renowned human resources development centres, include hotel management and tourism, promotion subject in the university curricula, extend maximum support to the private sector, training institutions, license tour guides in order to standardize the service accreditation of travel agents	Increase in number of direct & indirect employees up to one million
Conserve Fauna and Flora Attraction	Establish a new safari park at Ridiyagama, develop a new dry zone botanical garden in Mirijjawila, establish a new zoological gardens at Pinnawala	Maximum number of domestic and foreign tourist attraction
Improve Service Standards	Strengthen the regulatory bodies, Follow strict rules and regulation	Minimize Tourism related crimes, Improved global reputation as a high end tourism destination

(Source: Ministry of Economic Development Sri Lanka 2010)

Box 3-1 Development scenarios for the parks/reserves in Sri Lanka

Bundala National Park

- Upgrade of the camping facilities inside the park
- Provision of bungalows inside the park
- Improvement of the quality and experience of visitation with better interpretation services provided by the Department of Wildlife Guides
- Development of Wilmanna Sanctuary across the road to provide opportunities for viewing large herds of elephants
- Provision of night safaris, and viewing platforms during moonlit nights near watering holes

Minneriya National Park

- Provision of camping facilities and bungalows inside the park
- Limiting of traffic and the number of vehicles entering the park to reduce congestion
- Improvement of the quality and experience of visitation with better interpretation services provided by the Department of Wildlife Guides
- Provision of elephant safari's inside the park
- Provision of boating facilities in Minneriya Tank for elephant viewing
- Provision of opportunities for night safaris, and viewing platforms during moonlit nights near watering holes

Singharaja Forest Reserve

- Provisions of visitor centers with exhibits, clean restrooms, restaurants, camping facilities inside the reserve, and bungalows in the buffer zones of the reserve
- Provision of new visitor services such as elephant safaris and nature trails
- Improvement in the quality and experience of visitation with better interpretation services provided by the Forest Department Guides

Uda Walawe National Park

- Upgrade of the camping facilities and better maintained bungalows inside the park
- Limiting of traffic and the number of vehicles entering the park to reduce congestion
- Improvement in the quality and experience of visitation with better interpretation services provided by the Department of Wildlife Guides
- Provision of opportunities for night safaris, and viewing platforms during moonlit nights near watering holes

Yala National Park

- Provisions of visitor centers with exhibits, clean restrooms, restaurants, camping facilities, and better maintained bungalows inside the park
- Provision of new visitor services such as elephant safaris, nature trails, visiting cultural sites/ruins, night safaris, and viewing platforms during moonlit nights near watering holes
- Limiting of traffic and the number of vehicles entering the park to reduce congestion
- Improvement in the quality and experience of visitation with better interpretation services provided by the Department of Wildlife Guides

(Source: World Bank tourist survey 2010)

Table 3-2 Species diversity and conservation status of some flora and fauna in Sri Lanka

Indigenous plant species	Total no. of species and (endemics)	Number of nationally threatened species	
		Non-endemic	Endemic
Flowering plants	3771 (927)	252	412
Ferns & fern allies	314 (59)	60	30
Vertebrate species			
Mammals	91 (16)	27	14
Birds	482 (33)	30	16
Reptiles	171 (101)	19	37
Amphibians	106+ (90+)	1	51
Fishes (Fresh water only)	82 (44)	8	20
Invertebrates species			
Bees	148 (21)	-	-
Ants	181 (??)	-	-
Butterflies	243 (20)	13	53
Spiders	501 (?)	-	-
Land snails	246 (204)	32	1
Dragon flies	120 (57)	20	-
Fresh water crabs	51 (51)	37	-
Fresh water shrimps	23 (07)	-	-

(Source: Gunatilleke et al. 2008)

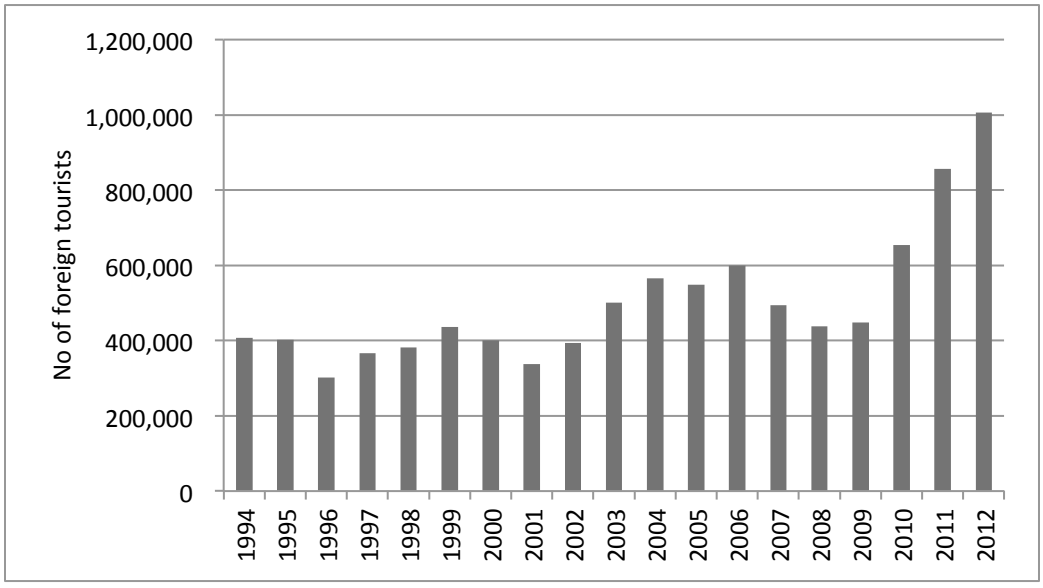


Fig. 3-1 Foreign tourist arrivals to Sri Lanka from 1994-2012

(Data: Annual statistical reports, Sri Lanka Tourism Development Authority)

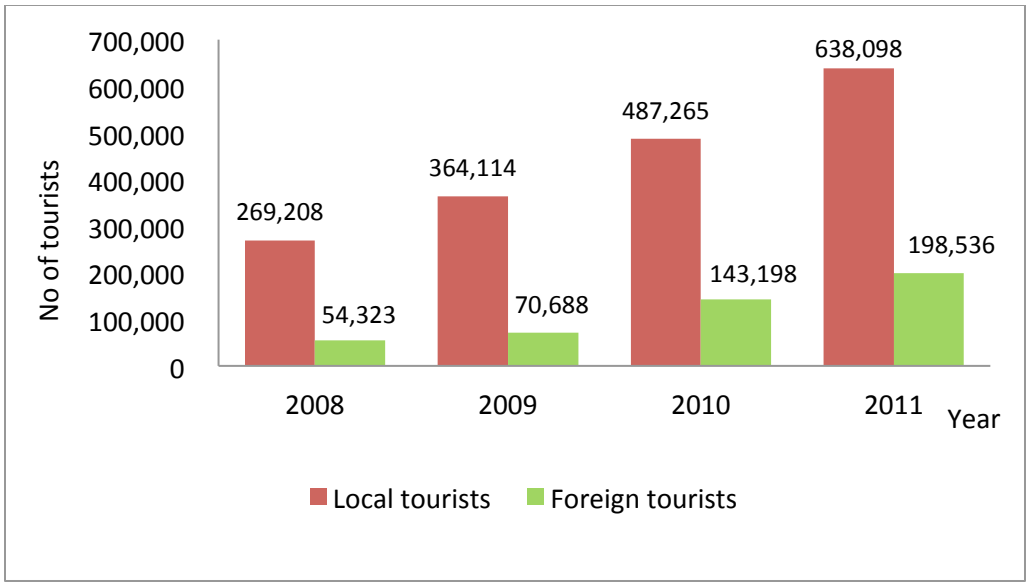


Fig. 3-2 Number of local and foreign tourists to wildlife parks in Sri Lanka from 2008-2011

(Data: Annual statistical reports, Sri Lanka Tourism Development Authority)

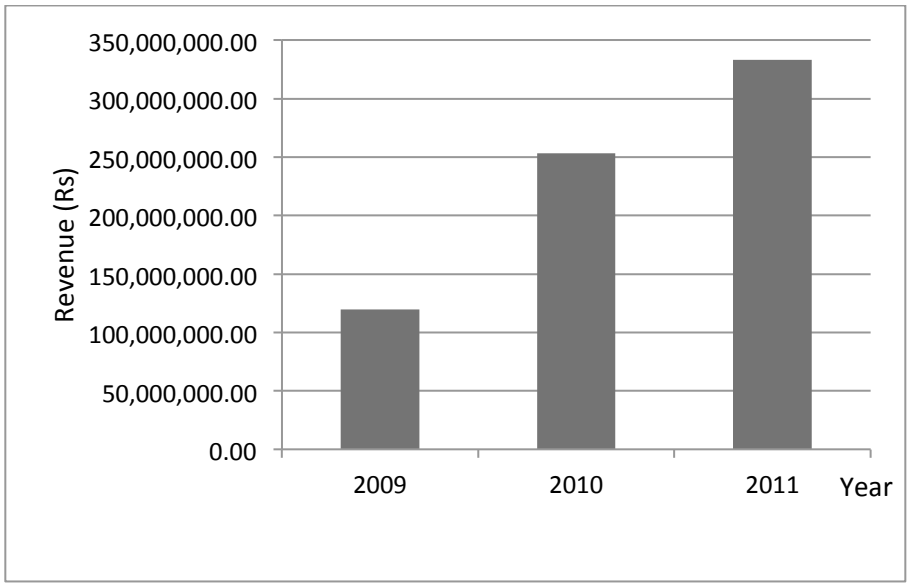


Fig. 3-3 Revenue from entrance fees for local and foreign tourists

in wildlife parks in Sri Lanka from 2009-2011

(Data: Annual statistical reports, Sri Lanka Tourism Development Authority)

Box 3-2 A tourism impact research in Ruhuna National Park (Yala) in Sri Lanka

Yala covers 151,177.8 ha of land in the south- east of the country and it is the most visited national park in Sri Lanka.

The park receives two types of tourists: wildlife tourists and tourists on pilgrims. Kataragama, adjacent to the Park and Adam's Peak are among the most important pilgrim sites in Sri Lanka. Many pilgrims also visit Sithulpauuwa, which is also located in Yala, during their pilgrimage.

There were 153,661 wildlife tourists to the park in 2000 and created a direct income of approximately US$468,629. There are no official statistics on pilgrims, however estimated as 400,000 pilgrims per year with a peak from June to August of 200,000 pilgrims and 1000 pilgrims on a given day during this period.

Wildlife tourists have to pay an entrance fee and should be accompanied by a guide during the tours. Pilgrims do not have to pay such fees or not required to be accompanied by a guide.

Over crowding is a major concern in this park. At peak times of wildlife viewing (when wildlife are at waterholes) there can be up to 150 vehicles arriving at the same time. Off road driving occurs to get a better and close sighting of the wildlife. There are only about 31 park guides and they cannot accompany all vehicles at times of heavy visitation. Guides are under pressure to ensure the visitors gain a good viewing since most of their income is based on tips from tourists. Religious tourists are found to be less well educated and less concerned about the environmental values of Yala. They are reported to leave the road net works, and also collect firewood for cooking and recreational purposes.

Pollution is another negative impact of tourism in Yala. Litter from tourists can be seen along the road networks, tourist bungalows, campsites and religious sites. Various animals can be seen foraging through litter dumps. There is no system of handling garbage in the park. Poor toilet facilities, some times without water supply add to the problem, especially near religious sites. Further, buses of pilgrims paly music loudly, which causes noise pollution in the park.

High turnover of wildlife authority has also impacted in having a consistent management system in the park and there is also lack of specialized personnel in tourism planning in the park. Further, lack of funding for park management has resulted in poor facilities, poor levels of interpretation and no studies on carrying capacity to identify appropriate visitor levels.

However, some initiatives have been taken by the park management to improve the situation such as monthly meetings with safari drivers and operators to explain the park rules and expectations for operators and tourists. Some coordination with local schools has been done to create awareness among school children of the environmental importance of Yala.

(Source: Buultjens et al. 2005)

2. Conservational and recreational value of Udawalawe National Park in Sri Lanka

2.1. Conservational value of Udawalawe National Park

Udawalawe national park (UWNP), located approximately between the latitudes 6‟25” and 6‟35” N and longitudes 80‟45” and 81‟00” E, an altitude of 118 above sea level, is a key protected area in southern Sri Lanka. The Park lies in the Ratnapura District in Sabaragamuwa province and Moneragala District in Uva province (Fig. 3-4) and forms the largest conservation areas within the two districts. UWNP was established in 1972 under a legal act, Fauna and Flora Protection ordinance, to provide habitat for wildlife displaced by the construction of the Udawalwe reservoir and to protect the catchment area of the reservoir. The land area of UWNP is about 308-square kilometers. The road accessibility is limited to approximately 1/3 of the park. The temperature in Udawalawe is usually high with some seasonal rainfall. The annual average temperature is 32°C. The rainy season is from March to April and then again from October to December. The dry season is from May right through to September (Zubair et al. 2008). The average annual rainfall is about 1524mm. UWNP includes two major man-made reservoirs inside the park; Udawalawe reservoir and Mauara reservoir. There are several streams as well. The park is encircled by electric fencing, but there are two corridors connecting the park to the exterior; one in the north side and the other in the East side of the park. All the boundaries of the UWNP have been occupied by farming communities and there are 52 villages surrounding the park.

The dominant vegetation types are scrublands, grasslands and dry-mixed evergreen forests (Plate 3-1 to Plate 3-3). Much of the forest area has been cleared for slash and burn cultivation by farmers prior to the constitution of the national Park in 1972. Some plantations of teak can be seen beyond the southern boundary that was planted before the declaration of the park (Plate 3-4). Scrubland is dominated by Damaniya (Grewia tiliifolia). Grassland is dominated by Mana (Cymbopogon confertiflorus), Illuk (Imperata cylindrica) and Pohon (Pennissetum olystachyon). However in recent times open areas are getting colonized by invader plants such as Gandapana (Lantana camara) and Kuratiya (Phylanthus polyphyllus) as a result of over grazing by domestic animals.

UWNP provides habitat to a large number of wildlife species that lost their habitat due to the development projects centred on Udawalawe. Out of these wildlife species the elephant (Elephas maximus maximus) is the predominant animal species. According to wildlife authority in Sri Lanka, Udawalawe national park carries one of the largest elephant populations in the country, however the exact number of elephants is still uncertain. The census carried out by the department of wildlife conservation in 1992 recorded that the elephant population is around 350 individuals. Moss (1996) identified over 300 adult female and 152 adult male elephants individually in UWNP. Jayantha et al. (2009) states that UWNP harbors an elephant population exceeding 500 individuals. More recent records indicate that the number of adult female elephants alone is over 300 (De Silva 2010). Number of solitary males is also over 300 (Ranjeewa 2011) and the estimated elephant population of the park is between 800-1100 (De Silva 2010). Elephants are of high ecological value. Campos-Arceiz and Blake (2011) reviews the role of elephants in seed dispersal and explains that elephants disseminate many seeds of trees over long distances, thus they are an essential part of ecosystem functioning. Further, elephant dung is used as a source of nutrients by various species. "When a megaherbivore such as the elephant disappears from regions within its original distribution area, the ecosystems tend to change" (Chardonnet et al. 2007). Decrease or disappearance of elephant populations will result in a poor dispersal of plant species at short distances or no dispersal at all and negatively impact on the whole ecological communities (Campos-Arceiz and Blake 2011). Therefore, conservation of elephants is essential for the healthy functioning of ecosystems, however the conservation status of elephants is a prevailing issue due to the ongoing human-elephant conflict (Ranaweerage 2012). Udawalawe National Park with its vegetation types and geographical features is a favorable habitat for elephants and an area of high conservational value of wildlife. Therefore it is important to minimize pressures from human activities in order to protect wildlife, especially elephants. UWNP has a facility called Elephant Transit Home where abandoned, injured or orphaned elephants are treated and then released back to the park.

Other large herbivore animals in the park are the Sambar deer (Cervus unicolor), the Ceylon Spotted Dear (Axis axis ceylonensis), the Barking deer (Muntiacus muntjak), the Ceylon Spotted

Chevrotain (Tragulus meminna), the Wild Boar (Sus scrofa) and the Water Buffalo (Bubalus bubalis). The smaller herbivores that dwell in the UWNP include the Jackal (Canis aureus), the Asian Palm Civet (Paradoxurus hermaphroditus), small Indian civet (Viverricula indica), the toque-macaque (Macaca sinica), Common langur (Semnopithecus priam thersites), the Black-naped Hare (Lepus nigricollis), and the endemic Golden Palm Civet (Paradoxurus zeylonensis). The Sri Lankan Leopard (Panthera pardus kotiya), a leopard subspecies native to native to Sri Lanka is also found in the UWNP along with the Rusty Spotted Cat (Felis rubginosa), and the Fishing Cat (Felis viverrinas). But unlike in the Yala National Park (Another large national park in southern Sri Lanka) the sightings of leopard are rare. The Sloth Bear (Melurus ursinus) also inhabits the UWNP but the sighting is extremely rare as its numbers are low. There are 5 types of mice in the Park and out of these the Ceylon Spiny Mouse (Mus fernandoni), and the grassland dwelling Bush Rat (Golunda elliotti) is a common sight. 50 kinds of butterflies are present in Park. Large number of birds species are found in UWNP and certain species are unique to Sri Lanka. Avifauna includes large number of Warblers (Prinia sp.), low country birds in the forest area and a variety of raptors. Water birds include Indian cormorant (Phalacrocorax fuscicollis) and Osprey (Pandion haliaetus). Endemic bird species include Sri Lanka jungle fowl (Gallus lafayettii), Malabar pied hornbill (Anthracoceros coronatus), Sri Lanka grey hornbill (Ocyceros gingalensis) and Brown-capped babbler (Pellorneum fuscocapillum). In addition to this a large number of small species of bird as well as the carnivorous species of eagles fly freely about in Udawalawe. The immigrant Indian White Wagtail (Moticilla alba) and the Black-capped Kingfisher (Halcyon pileata) have been observed in the park. At present 30 different species of snakes and three species of Mongoose (Herpestes fuscus, Herpestes smithi and Herpestes vitticollis) have been observed in the Park. Out of the reptiles found in the Park the lizard species of Oriental Garden Lizard (Calotes versicolor) which is found only in the dry zone, and the Sri Lankan Bloodsucker (Calotes ceylonensis) are common. The Mugger Crocodile (Crocodylus palustris), the Monitor Lizard (Varanus monitor), and the Bengal Monitor (Varanus bengalensis) also inhabit the Park.

Despite the high diversity of wildlife species in the park, many wildlife species are threatened in terms of conservation status (Table 3-3).

Table 3-3 Conservation status of some wildlife species inhabiting Udawalawe National Park

Wildlife species	Conservation status
Sri Lankan elephant (Elephas maximus maximus)	Endangered
Sri Lankan leopard (Panthera pardus kotiya)	Endangered
Fishing cat (Prionailurus viverrinus)	Endangered
Toque macaque (Macaca sinica)	Endangered
Ceylon Spiny Mouse (Mus fernandoni)	Endangered
Sambar deer (Cervus unicolor)	Vulnerable
Golden Palm Civet (Paradoxurus zeylonensis)	Vulnerable
Rusty Spotted Cat (Felis rubginosa)	Vulnerable
Sloth Bear (Melurus ursinus)	Vulnerable
Indian Brown Mongoose (Herpestes fuscus)	Vulnerable
Mugger Crocodile (Crocodylus palustris)	Vulnerable
Malabar pied hornbill (Anthracoceros coronatus)	Near threatened
Endangered means high risk of extinction in the wild Vulnerable means high risk of endangerment in the wild Nearly threatened means likely to become endangered in the near future	

(Source: IUCN Red list of threatened species 2012)

2.2. Elephant watching tourism at Udawalawe National Park

Udawalawe national park (UWNP) is one of the best places to view wild elephants in Sri Lanka, because elephants can be seen any time of the day and any period of the year. The reasons for this easy visibility and high sighting are the large open area with less shrubs and the high population density compared to other parks in the southern region. Further, the newest international airport in southern Sri Lanka, easy accessibility to the park from Colombo, and its location on a route to several other famous tourist destinations in the country can also be assumed as reasons for high number of tourists. In 2011, about 85,000 local and foreign tourists visited UWNP and it is the third most visited wildlife park in the country (Sri Lanka Tourism Development Authority, annual statistical report 2011). The number of foreign and local tourists to UWNP and the revenue from tourism has increased in recent years (Fig. 3-6 and Fig. 3-7).

Tourists have to pay an entrance fee to enter the park and to observe wildlife. They also have to hire an off road vehicle to travel inside the park. Safari jeeps are available with drivers at the park entrance. The vehicle hire fee differs according to the duration of the wildlife excursion from few hours to the whole day or several days. Tourists are not allowed to get off the vehicles inside the park. There are several campsites and tourist bungalows inside the park as well. There are about 30 volunteer guides to accompany tourists during the excursions. There are also some rules set for tourists by the wildlife conservation authority as follows.

- Refrain from collecting or destroying any plant or animal
- Refrain from getting closer to or disturbing the animals
- Refrain from throwing garbage, cigarette butts or live matches
- Refrain from music instruments, audiocassettes or radios
- Refrain from lighting fires inside the park
- Refrain from taking into the park any pet, plants or prohibited kinds of meat
- Refrain from carrying weapons inside the park
- Refrain from remaining in the park beyond the permitted hours

UWNP is created with the purpose of protecting wildlife, yet tourism is an important asset to obtain funds for conservation, park management and other economic and social benefits to the area. This is a case where tourism and conservation should work together. Numerous biological and ecological studies have been conducted in the park such as demography of Asian elephants at (De Silva 2010), however tourism related research are very few. Therefore, considering the conservation value, expansion of tourism and lack of research, this study chose UWNP as the research site to find out tourism impacts on environmental sustainability in protected areas.

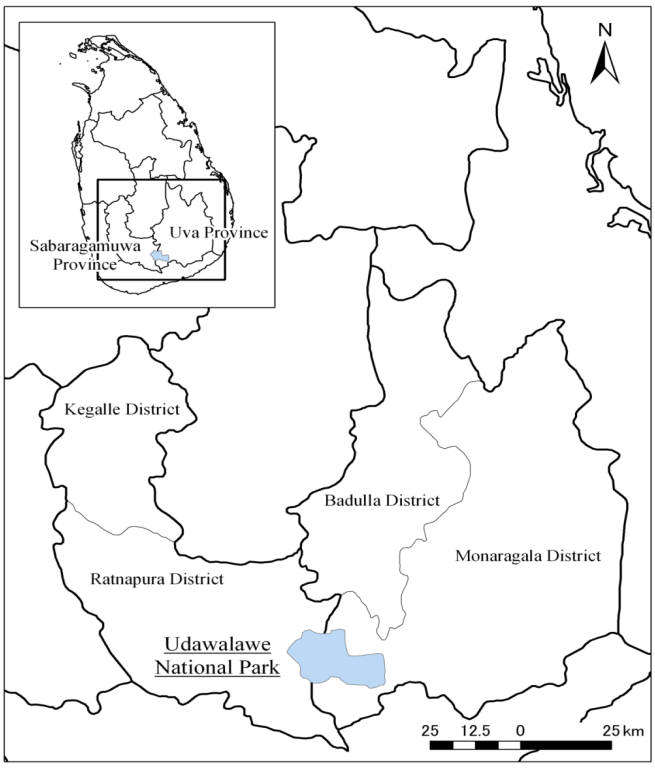


Fig. 3-4 Location of Udawalawe National Park

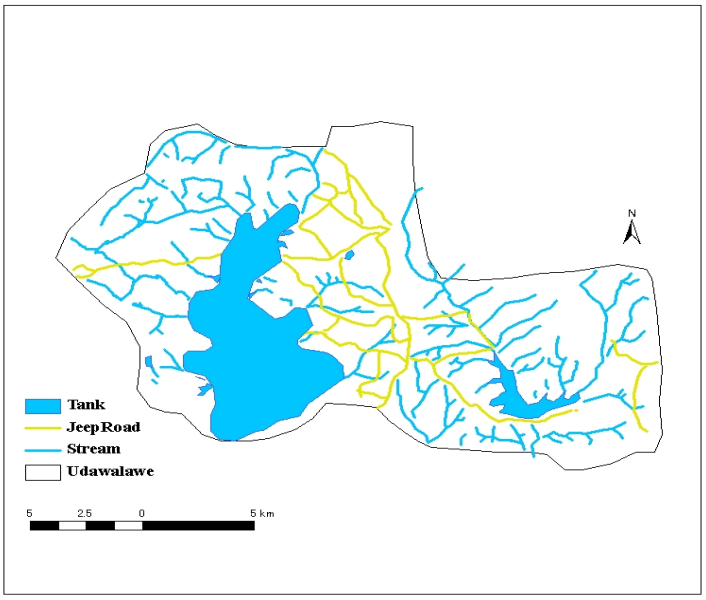


Fig. 3-5 Park map of Udawalawe National Park

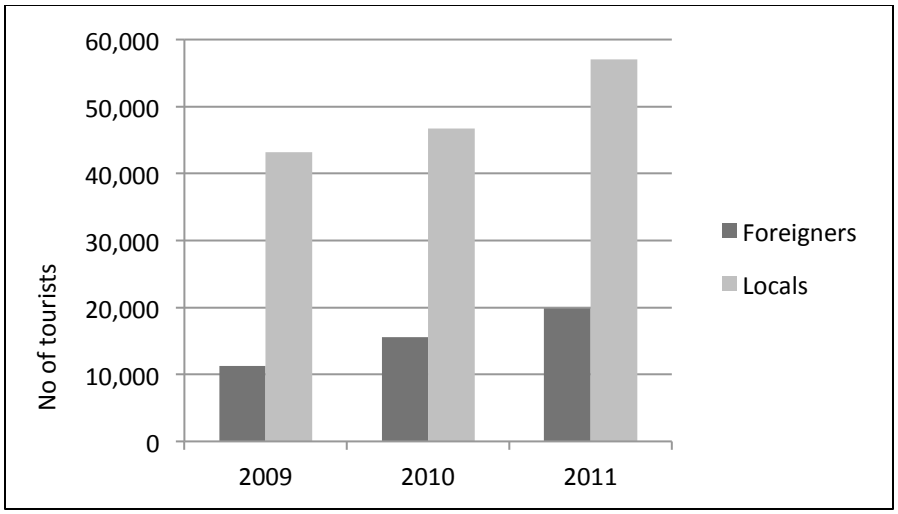


Fig. 3-6 Number of local and foreign tourists to Udawalawe National Park from 2009-2011

(Data: Annual statistical reports, Sri Lanka Tourism Development Authority)

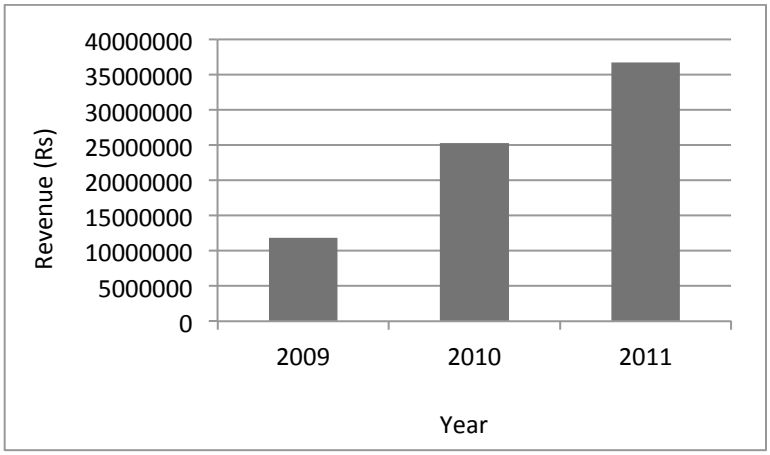


Fig. 3-7 Revenue from entrance fees for local and foreign tourists

to Udawalawe National park from 2009-2011

(Data: Annual statistical reports, Sri Lanka Tourism Development Authority)

IV. Characteristics, values and behavior of wildlife watching tourists : Case study of Udawalawe National Park in Sri Lanka

This chapter discusses the characteristics, values and behavior of wildlife watching tourists by conducting a case study in a famous wildlife watching destination in Sri Lanka. The discussions are based on the results of a questionnaire survey (focusing on tourists' specialization in wildlife watching and orientation towards wildlife values) along with the direct observations of tourist behavior during wildlife viewing.

1. Measuring tourist characteristics, values and behavior

One of the main arguments for the continuing development of wildlife watching tourism is that they help to secure long-term conservation of wildlife and have potential to positively influence the knowledge, attitudes, and behavior of tourists (Ballantyne et al. 2009). However, a significant proportion of tourism focuses on endangered or threatened species and visitation leaves imprints that can have cumulative and substantial negative impacts on wildlife and their habitat (Marion and Reid 2007). Therefore, one of the greatest challenges of wildlife watching tourism is protecting and conserving the wildlife and their habitat whilst managing the needs of tourists. Especially, with the number of participants steadily increasing, there is growing recognition that wildlife watching can have detrimental effects on wildlife and their habitat. Therefore, visitor management in wildlife watching areas is highly important as majority of wildlife management problems originate from the behavior of visitors.

Understanding the visitor characteristics is critical for visitor management because it improves the managers' ability to consider the public demands in decision making and the ability to predict human behavior and the ability to identify ways to affect thought and behavior of visitor. However, wildlife tourism as a whole lacks important information on the needs, desires, and opinions of the public (Duffus and Dearden 1993). Understanding the nature of visitors is an important but little researched element of wildlife tourism. While there are many references to the size and growth of this market in the existing literature, very little is known about the actual demand for non-consumptive wildlife tourism and what

characterizes tourists who desire wildlife encounters during their holidays (STCRC 2009). Characteristics of nature-based tourists, especially wildlife tourists are often revealed based on socio-demographic factors (Carver 2009), however it is difficult to understand the aspects such as involvement, commitment or centrality of tourists in a wildlife tourism activity or the attitudes towards wildlife only based on socio-demographic factors. Therefore, this study aimed to find out tourist characteristics in terms of specialization, which can better identify the domains such as tourists' commitment, interest and centrality, and in terms of their environmental concerns such as wildlife values as well as actual behavior during tours in the context of rapidly growing elephant watching tourism at UWNP in Sri Lanka. Three research questions were constructed accordingly.

(1) Are most wildlife watching tourists to a natural wildlife park highly specialized in wildlife watching?

(2) Do highly specialized tourists have high levels of environmental concern, such as wildlife values?

(3) Do higher levels of specialization and environmental concerns reflect on the actual behaviors of tourists during wildlife watching?

A questionnaire survey was carried out in March 2012 for a period of one week and 112 tourists to the park participated in the survey among which 62 were foreigners and 50 were locals. Group size of tourists varied from single to large groups (about 8 people in a vehicle). Due to the time restriction it was not possible to obtain answers from several or all the members of one group at the same time. There was also a tendency that members in the similar group providing similar answers. Therefore, only one completed questionnaire per group was included in the analysis. The questionnaire consisted of two sections.

The first section included questions to reveal tourists' specialization of wildlife watching. The questions were adopted from a concept called recreation specialization developed by Bryan (1977). The "Recreation Specialization" concept was to explain diversity among participants in a given activity. Bryan proposed that within any given activity, there are distinct "classes of participants" who exhibit distinct "levels of specialization". The classes of participants vary from highly specialized to novices based on their levels of specialization in the activity. The levels of specialization are measured using three

indicators; behavioral indicator such as frequency in participation or prior experience in the given activity, affective indicator meaning the centrality of the given activity to lifestyle and intensity of involvement, cognitive indicator such as equipment ownership and environmental group affiliation. Novices have a greater interest in the non-wildlife aspects of their tourism experiences than do specialist participants. Specialist users, on the other hand, are more concentrated on the focal species, and are more likely to be conservation minded. Bryan (1977) explains that an understanding of these variations is crucial to the provision of desired experiences, prediction of visitor behavior and identification of ways to affect visitor behavior. Therefore, this study used the above concept in designing the questionnaire and identifying the characteristics of the tourists to UWNP.

First, visitors were asked to what extent does the opportunity to view wildlife influence on their decision making in leisure based on a five point Likert type scale from 1 = 'never' to 5 = 'always'. This was to find out the centrality or importance of wildlife viewing in leisure decision making compared with other leisure pursuits followed by several other specialization indicators such as frequency in participation in wildlife excursions, involvement in environmental activities, specialized equipment ownership and purpose of visit.

The second section of the questionnaire inquired about wildlife values of tourists based on the wildlife value orientation scale developed by Fulton et al. (1996). Values form the basis of specific attitudes, influence behavioral intention and behavior, and so form a useful concept in understanding and managing visitors (Stern and Dietz 1994, Stern 2000, Vaske and Donnelly 1999). In relation to natural areas, both personal and social values are relevant (Winter 2005). Personal values relate to a person's own life and they have been used in a tourism context to analyze travel behavior and visitation to attractions and destinations, to guide product development and communication strategies (Blamey and Braithwaite 1997, Madrigal and Kahle 1994). Social values relate to broader community and worldly issues and are particularly relevant where an element of social good such as the natural environment is involved (Blamey and Braithwaite 1997). Values and orientations have been used in the context of natural resource management and in the developing field of ecotourism to understand the relationship between visitors and

natural sites and to anticipate their attitudes and behavior (Fennell and Nowaczek 2003). For example, groups with higher environmental concern have been found engaged in appreciative activities rather than consumptive activities (Jackson 1986). An understanding of values is important because values are the most fundamental factor that directs much of human volitional behavior (Stern and Dietz 1994), an understanding of wildlife values is useful in predicting patterns of attitudes and behaviors across a set of wildlife issues (Fulton et. al. 1996). Values are general mental construct defined as "what we hold dear" such as family values, religious values, economic values, and even value of wildlife (Rokeach 1973). Furthermore, individuals have few values, and these fundamental constructs are usually without specific reference to objects or issues (Fulton et al. 1996). Because values are a central construct formed early in life they are shared by all members of a culture, however, individual differences account for much of the variability in specific attitude, norms, and behaviors. Values cannot be directly observed, however an individual's basic beliefs can be measured, which can then be used to identify individuals' value orientations. Value orientations are the patterns of directions and intensity of these basic beliefs (Fulton et al 1996). Further, according to this concept, values and value orientations are believed to direct attitudes, attitudes are believed to direct behavior and identifying value orientations can help explain behavioral intensions and behavior. Therefore, in this study, wildlife values of wildlife watching tourists were measured using the Wildlife Values Orientation Scale (WVOS), which includes two scales; Utilitarian and Mutualist (Fig. 4-1). Utilitarian scale includes domains such as wildlife use, wildlife rights and hunting beliefs (Table 4-1). One statement for each domain were included in the questionnaire considering the time for its completion. Visitors were asked to assess these domains using seven point Likert scale from 1= "Strongly disagree" and 7= "Strongly agree". For example, to assess wildlife use, visitors were asked how strongly they agree or disagree with the statement; "Humans should manage wild animal populations so that humans benefit" and to assess hunting beliefs, visitors were asked how strongly they agree or disagree with the statement; "Hunting enables people to enjoy the outdoors in a positive manner". Mutualist scale includes domains such as wildlife education, residential wildlife experience, bequest and existence of wildlife (Table 4-1). For example, to assess wildlife education,

visitors were asked how strongly they agree or disagree with the statement “I enjoy learning about wildlife” and to assess residential wildlife experience; they were asked to rank the statement “Having wildlife around my home is important to me”. Based on these two scales, WVOS divides visitors into four categories; Utilitarian (people who believe wildlife exist primarily for human use), Mutualist (People who believe wildlife and humans should co-exist in harmony), Pluralists (mix of Utilitarian and Mutualist types) and Distance (people who are less interested in wildlife or not oriented towards wildlife issues).

Direct observation of tourists who participated in the questionnaire survey was conducted simultaneously to identify tourist behavior during elephant watching tours. The observations focused on two main factors that can lead to disturbing elephants, tourist behavior on board and the distance to elephants. Tourist behavior was categorized into three types; Calm (silent meaning no talking with or without taking photographs), Loud (talk with or without taking photographs but no hand movements) and Extreme (talk-clap-wave, try to feed-play music-off road driving-other). The observations of behavior were done for the entire group. For example, to record as calm, all the members of the group should be silent with or without taking photos. Continuous observation of tourist behavior for 30 minutes was targeted per group. Observations were conducted from a vehicle at a less than 5-meter distance from the selected group. Digital stopwatches were used to measure time for each behavior. The distance from tourists to elephants was measured using a range finder.

Statistical analysis

Pairwise and multiple comparisons of the three groups were conducted for each specialization indicator by using Fisher’s exact test to identify the significance in the difference among tourists with different specialized levels and to compare the factors such as group size and distances related to different specialized groups. Factor analysis was applied to categorize the tourists in the wildlife value orientation scale to determine the value orientations of the different specialized groups (Number of factors 2,parallel analysis scree plots to determine the number of factors, number of factors 2, promax for rotation, Bartlet to compute each factor). Wilcoxon rank sum test and Kruskal-Wallis rank sum test were performed to

compare the specialization and actual behavior as well as group size and behavior both pairwise and multiple basis. Welch two sample t-test was used to compare the difference in the behavior among different group sizes. Software used for the analysis of this chapter was R (ver. 3.1.0).

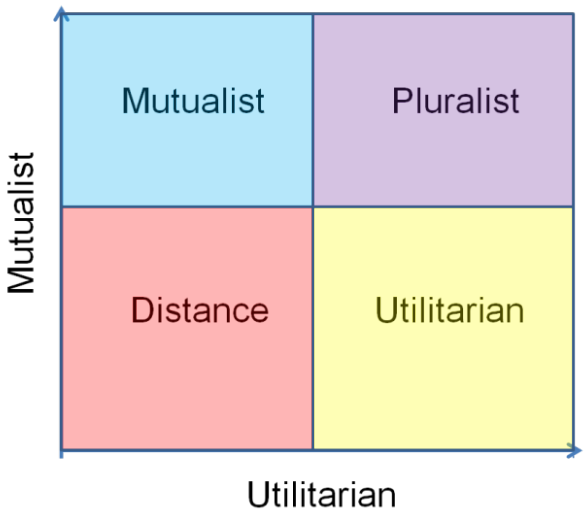


Fig. 4-1 Wildlife Value Orientation Scale (WVOS)
(Source: Fulton et al. 1996)

Table 4-1 Factors assessed in Wildlife Value Orientation Scale

Utilitarian	Mutualist
Humans should manage wildlife populations so that humans benefit	Having wildlife around my home is important to me
The needs of humans should take priority over wildlife protection	I enjoy learning about wildlife
Hunting enables people to enjoy the outdoors in a positive manner	I enjoy watching wildlife when I take a trip outdoors
Hunting is cruel and inhumane to animals	It is always important to have abundant wildlife

2. Specialization and wildlife values of tourists

The highest percentage, 43% of the total participants (n=48) gave negative answers; i.e. “never” or “rarely” (Fig. 4-2). 39% of the participants (n=44) answered “sometimes” and 18%, the least number of participants (n=20) gave positive answers; i.e. “often” or “always” to the question regarding the centrality of wildlife watching in their leisure decision-making.

Visitors who answered that opportunity for wildlife viewing “never/rarely” influenced their decision when making for holidays had very low frequency in participating in wildlife-viewing since 46% of them said that it was their first time to take a wildlife excursion (Fig. 4-3). At the same time, 85% of these visitors said that this park was not their main destination and it was only a one among several other destinations or they did not even have a plan to visit the park originally (Fig. 4-4). The purpose of their visit to the park was mainly to be with friends or family togetherness (Fig. 4-5). They placed extremely low importance on studying/ exploring wildlife or getting close to nature. Regarding the equipment they brought with them for the wildlife excursion, there were a significant number of people who did not bring any equipment with them and even if they bring it was only photographic equipment (Fig. 4-6). 90% of these visitors were not involved in any environmental group related to wildlife conservation (Fig. 4-7). Therefore, the visitors for whom opportunity for wildlife watching never/rarely impacted when deciding for their holidays had low frequency in participation in wildlife watching, less interest in studying or enjoying wildlife and more emphasis on being with friends or family outing, less equipment ownership, no affiliation with environment groups could be recognized as the “Novice wildlife watching tourists”.

Visitors who answered that opportunity for wildlife watching “sometimes” influenced their decision when making for holidays had some frequency of participation in wildlife watching activities compared with the Novice wildlife watching tourists (Fig. 4-3 and Table 4-2) as most of them take wildlife excursions every few years (48%) or once a year (32%). Most of them said that the visit to the park was one of several destinations (Fig. 4-4). It was not a sudden decision to visit compared to previous group as low number of people answered “not a planned destination” (Table 4-2). Their purpose of participation was to be with friends and family as well as to study and enjoy wildlife (Fig. 4-5).

Regarding the equipment, it was mainly photographic equipment as the previous group (Fig. 4-6). There were few people who also brought binoculars with them. However, compared to the previous group there were very few people who did not bring any equipment with them. At the same there was certain amount of environment group membership (27% were involved in some sort of conservation work) in this group (Table 4-2). However, 73% of visitors did not have any such experience and were quite similar to Novice group. Therefore, the visitors for whom opportunity for wildlife viewing sometimes influenced when deciding for their holidays had some level of frequency in participation in wildlife viewing, interest in family/friends togetherness as well as enjoyment/studying wildlife. Some level of equipment ownership and environmental group membership could be recognized as "Generalist wildlife watching tourists".

Visitors who answered that opportunity for wildlife- viewing "often/always" influenced their decision when making for holidays had a very high frequency in participation in wildlife-viewing as majority (45%) of them answered that they take wildlife excursions 2-5 times a year and there were also people who participate in wildlife viewing more than 5 times a year (Fig. 4-3). Majority of the visitors said that this park was their main destination (Fig. 4-4). In the purpose of participating in wildlife excursions, these visitors placed a high emphasis on studying/enjoying/exploring wildlife and least on being with friends or family (Fig. 4-5). They reported a significantly greater diversity of equipment ownership in contrast to other two groups as they brought not only cameras or video cameras, but various other equipment such as binoculars, scopes, field guides, maps and torches (Table 4-2). They also had a greater degree of environmental group affiliation. 75% of these visitors were involved in environmental activities such as wildlife conservation (Fig. 4-7). Therefore, the visitors for whom opportunity for wildlife-viewing often/always influenced when deciding for holidays had a high frequency in participation in wildlife-viewing, their purpose of the visit was to study/ enjoy/explore wildlife, they had a high level of equipment ownership and affiliation with environmental groups compared to other two groups (Table 4-2) and could be recognized as "Expert wildlife watching tourists".

As explained above, three types of tourists; Novices, Generalists and Experts could be identified based on their specialization levels in wildlife watching. Majority of the visitors were Novices who were

less experienced and less interested groups in wildlife. These results suggest that the tourist specialization in wildlife watching at the UWNP was very low.

In the WVOS, Many novice wildlife tourists fell into the categories of "Utilitarian" (42%) and "Distance" (27%) in the wildlife value orientation matrix (Fig. 4-8), which is associated with consumptive practices of wildlife or uninterested in wildlife or wildlife related issues. Many of the generalists fell into the category "Pluralist" (48%) in the matrix (Fig. 4-8). These tourists scored both Utilitarian and Mutualist scales with high points. It showed a mix of values as consumptive practices of wildlife as well as co-existence with wildlife. All of the expert wildlife tourists fell into the category "Mutualist" as they scored mutualist domains such as wildlife education, residential wildlife experience and bequest higher than other two groups.

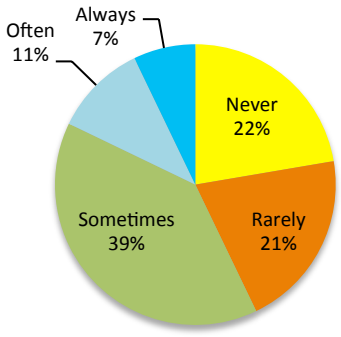


Fig. 4-2 The distribution of answers for "To what extent does the opportunity to view wildlife influence your decision when making for holidays?"

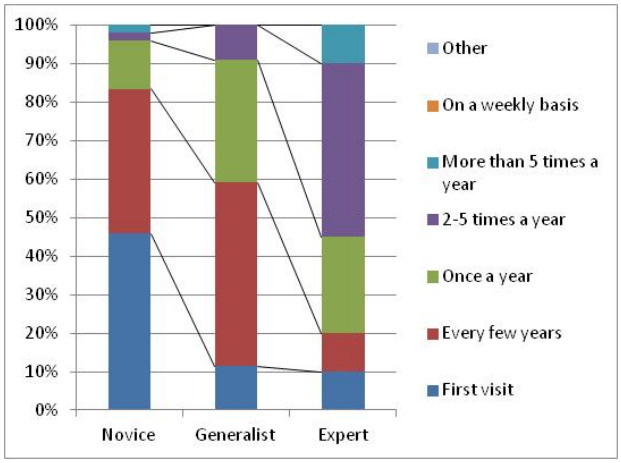


Fig. 4-3 Frequency of participation in wildlife excursions

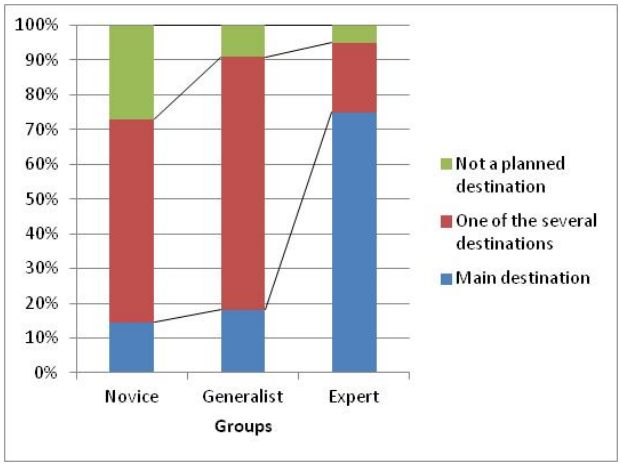


Fig. 4-4 Visit to the park was main destination or not

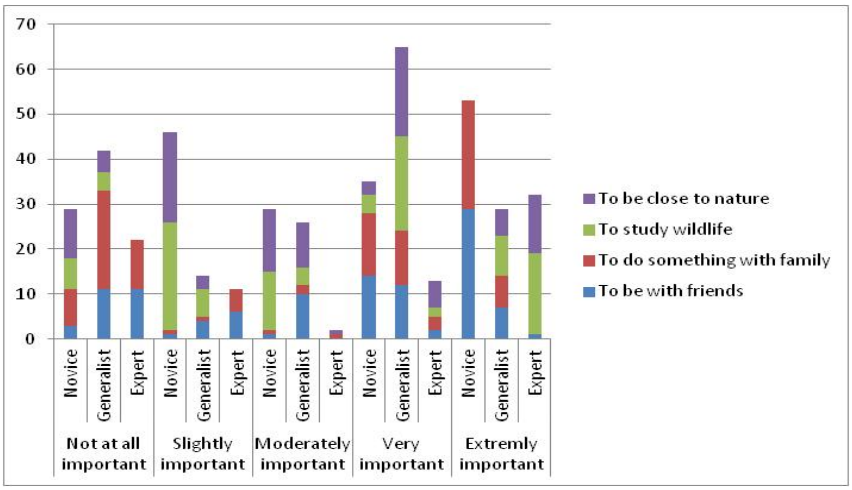


Fig. 4-5 Purpose of visit to the park

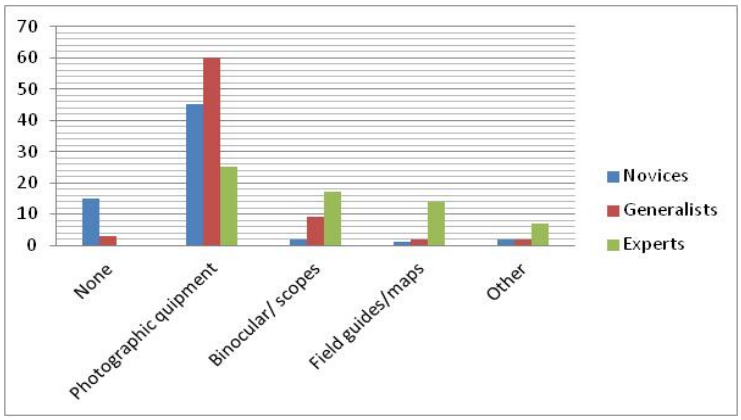


Fig. 4-6 Equipment ownership of the three groups

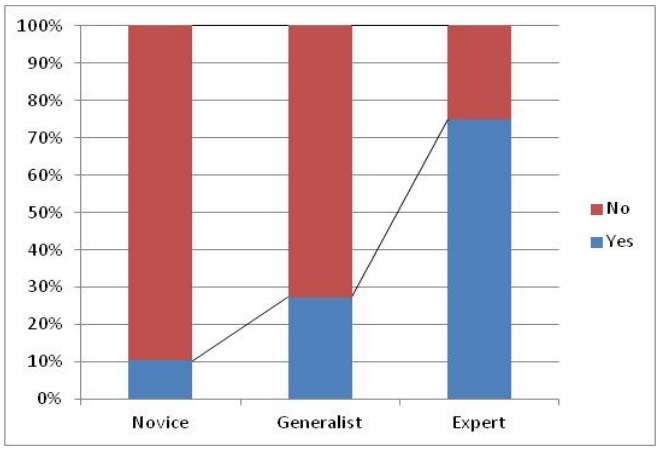


Fig. 4-7 Environmental group affiliation of the tourists

Table 4-2 Comparison of the three groups for each specialization indicator

Specialization indicator	P-value from Fisher's exact test (P < 0.05)			
	Novice-Generalist	Novice-Expert	Generalist-Expert	Novice-Generalist-Expert
Frequency in participation	0.000703	1.66E-06	0.000514	1.15E-07
Main destination or not	0.086050	1.05E-05	3.86E-05	2.99E-06
Environmental group affiliation	0.058320	3.35E-07	0.000775	9.70E-07
Equipment ownership	0.001407	2.84E-10	3.49E-06	7.85E-12
Purpose of visit				
To be with friends	4.64E-06	5.12E-09	0.002999	1.68E-10
To do something with family	0.000729	6.58E-07	0.016140	6.22E-07
To be close to nature	1.39E-07	8.81E-14	0.000798	4.05E-14
To study wildlife	2.47E-08	2.80E-16	6.23E-06	1.29E-17
To explore new things	0.023940	1.01E-09	0.000005	2.00E-09
To teach others about things here	0.003813	5.04E-09	0.000116	1.76E-08
To lead the group	0.005254	3.07E-05	0.135800	0.000174
To have a change from daily routine	0.091800	0.509300	0.013770	0.051933
To experience excitement	0.086490	0.620400	0.391500	0.259869
To do something creative such as photograph, paint, sketch	0.001043	0.542200	0.146300	0.004085

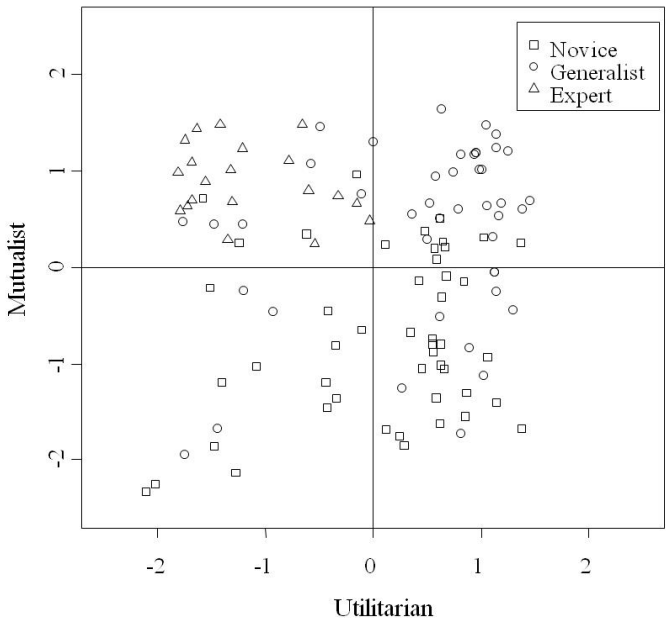


Fig. 4-8 Wildlife Values of the tourists to Udawalawe National Park

3. Tourist behavior during elephant-watching tours

Tourist behavior was measured based on two factors; physical behavior (calm, loud, extreme) and the distance kept when watching elephants.

Regarding the first factor, the three group types of tourists were different in their behavior during wildlife watching (Table 4-4). Novices stayed 39% of their time calm, 52% loud and 9% extreme behaviors during the observations (Fig. 4-9). Generalists were calm 32%, loud 61% and extreme 7% of the time. The expert group was calm 84% of the time, loud 15% of the time and showed only 1% extreme behavior. Generalists were slightly less calm than the novices. However, their extreme behavior was low compared to novices. (Larger sample size would have helped to better understand these changes). As indicated by the specialization and wildlife value concepts, experts tended to stay calm most of the time and displayed less disturbance behaviors compared to other two groups (Table 4-3). It was important to see whether the group size of tourists influenced the behavior, as only one questionnaire per group could be included in the analysis. Experts travelled mostly on individual or couple basis where as novices

travelled in large groups (Fisher's exact test p-value = 2.684e-09, also see Fig. 4-10). The comparison of tourist behavior with tourist group size showed that individual and couples or small groups displayed more calm behavior than the larger groups (Fig 4-11). Moreover, individual or couples showed positive behavior compared to other group sizes (Fig. 4-12). Even though Individuals, couples or small groups were calm in general, further differences could be recognized when categorized according to the three specialized groups (Fig. 4-13). For example, Novices in small groups were louder compared to Experts in small groups. Therefore, the composition of a group (whether novice, generalist or expert) is more likely to have impact on behavior rather than the group size.

However, regarding the second factor which is the distance from elephants, there was no significant difference among the three groups (Fisher's exact test P-value 0.9996) as all three groups watched elephants at very close distances, less than 10 meters (Fig 4-10).

Table 4-3 Pairwise comparisons of behavior of the three tourist groups

	Wilcoxon rank sum test P<0.005		
	Novice-Generalist	Novice-Expert	Generalist-Expert
Calm behavior	6.31E-06	1.73E-09	1.73E-09
Loud behavior	0.641435	2.11E-06	4.64E-06
Extreme behavior	0.002129	2.85E-07	2.59E-05
Overall	0.011573	0.011573	0.000356

Table 4-4 Multiple comparisons of behavior of the three tourist groups

	Multiple comparison test using Kruskal-Wallis rank sum test
	Novice-Generalist-Expert
Calm behavior	1.48E-13
Loud behavior	7.99E-07
Extreme behavior	2.32E-08
Overall behavior	0.000102

Table 4-5 Multiple comparisons of different group sizes with behavior

	Kruskal-Wallis rank sum test p<0.05 Individual-couple-small-medium-large groups
Calm behavior	7.16E-05
Loud behavior	1.92E-07
Extreme behavior	7.37E-05

Table 4-6 Pairwise comparisons of tourist group sizes with tourist behavior

Wilcoxon rank sum test p<0.05														
Calm behavior					**Loud behavior**					**Extreme behavior**				
	Individual	**Couple**	**Medium**	**Large**		**Individual**	**Couple**	**Medium**	**Large**		**Individual**	**Couple**	**Medium**	**Large**
Individual	**NA**	**0.588789**	**NA**	**NA**	**Individual**	**NA**	**0.129488**	**NA**	**NA**	**Individual**	**NA**	**0.994577**	**NA**	**NA**
Small	**0.111504**	**0.771913**	**0.047255**	**0.028454**	**Small**	**0.023038**	**0.208540**	**0.237486**	**0.005622**	**Small**	**0.469963**	**0.994577**	**0.137081**	**0.054494**
Medium	**0.006856**	**0.086108**	**NA**	**0.837155**	**Medium**	**0.004991**	**0.026334**	**NA**	**0.058718**	**Medium**	**0.019832**	**0.032397**	**NA**	**0.994577**
Large	**0.005887**	**0.050571**	**NA**	**NA**	**Large**	**0.000511**	**0.000169**	**NA**	**NA**	**Large**	**0.005582**	**0.003676**	**NA**	**NA**

Table 4-7 Comparison between Individual and couples with groups for behavior

	Welch two sample t-test p<0.05 Difference between (Individual+couple) and (Small+medium+Large groups)
Calm behavior	0.000311
Loud behavior	1.68E-07
Extreme behavior	7.88E-05

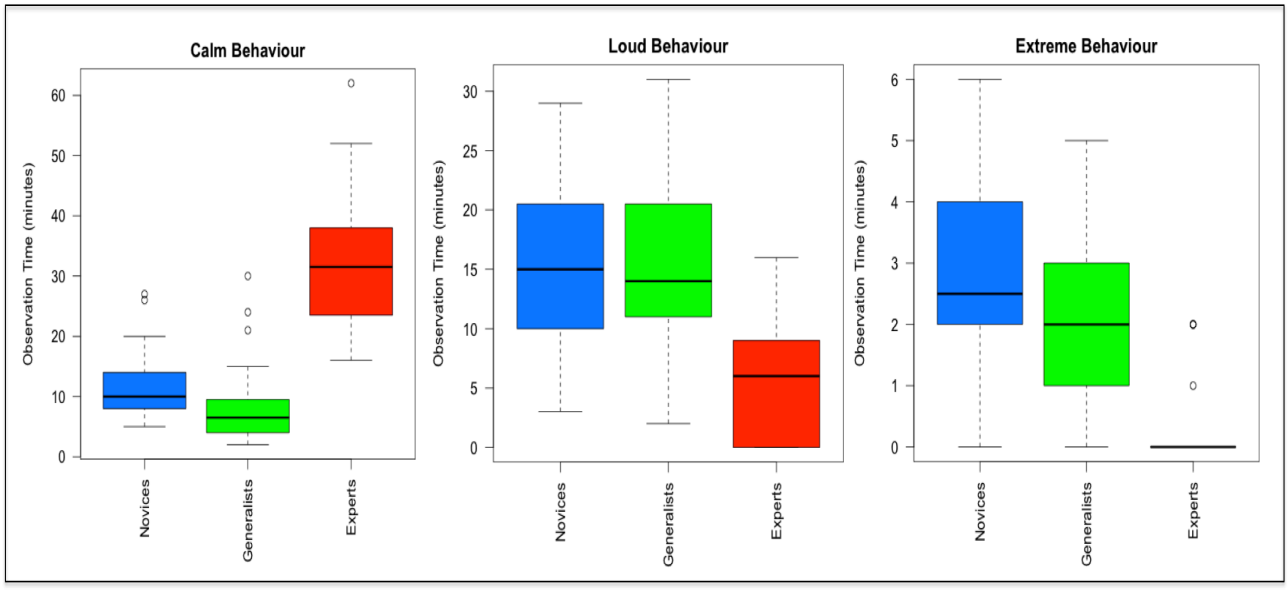


Fig. 4-9 Behavior of the there groups during elephant watching tours

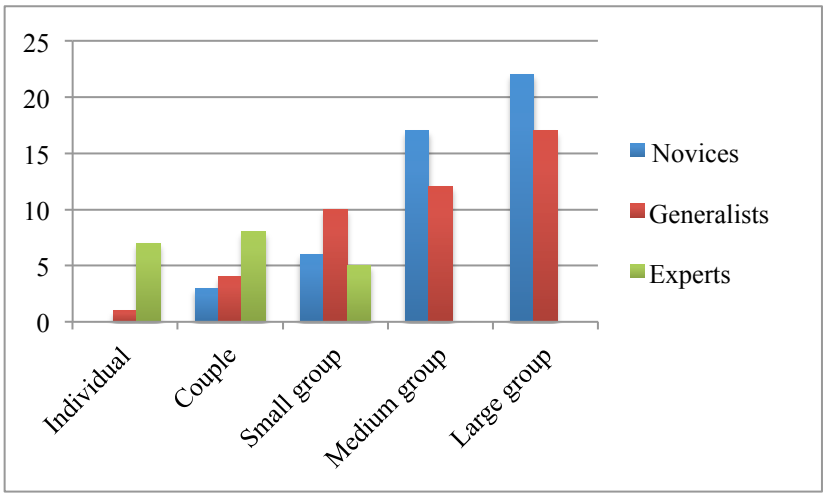


Fig. 4-10 Group size of the three groups

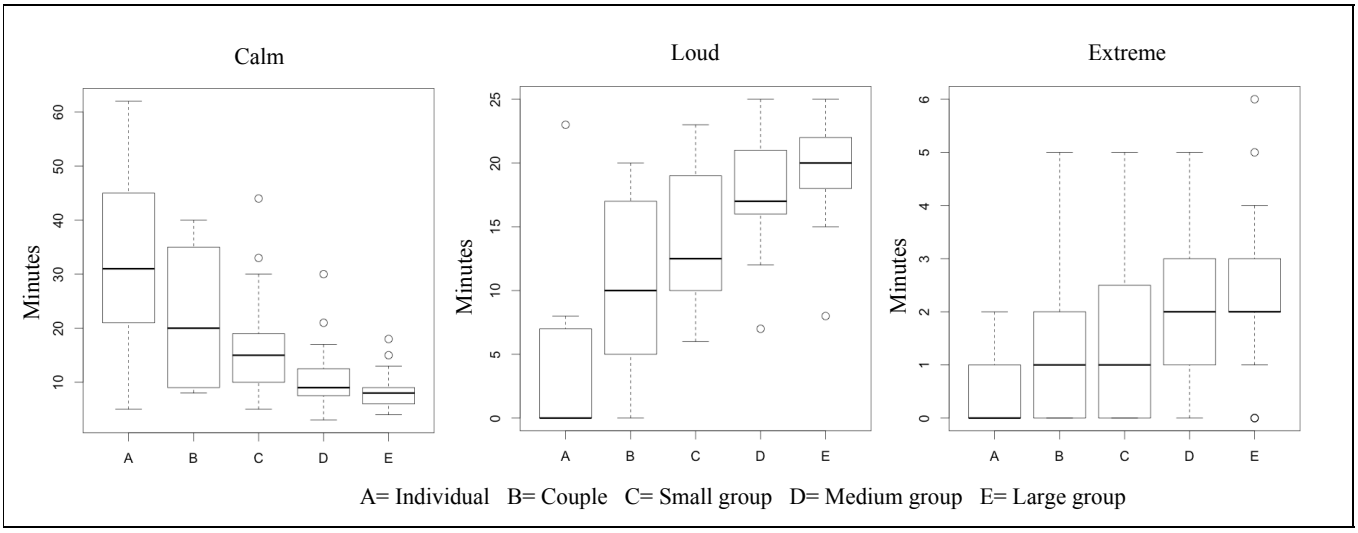


Fig. 4-11 Behavior of tourists based on the group size

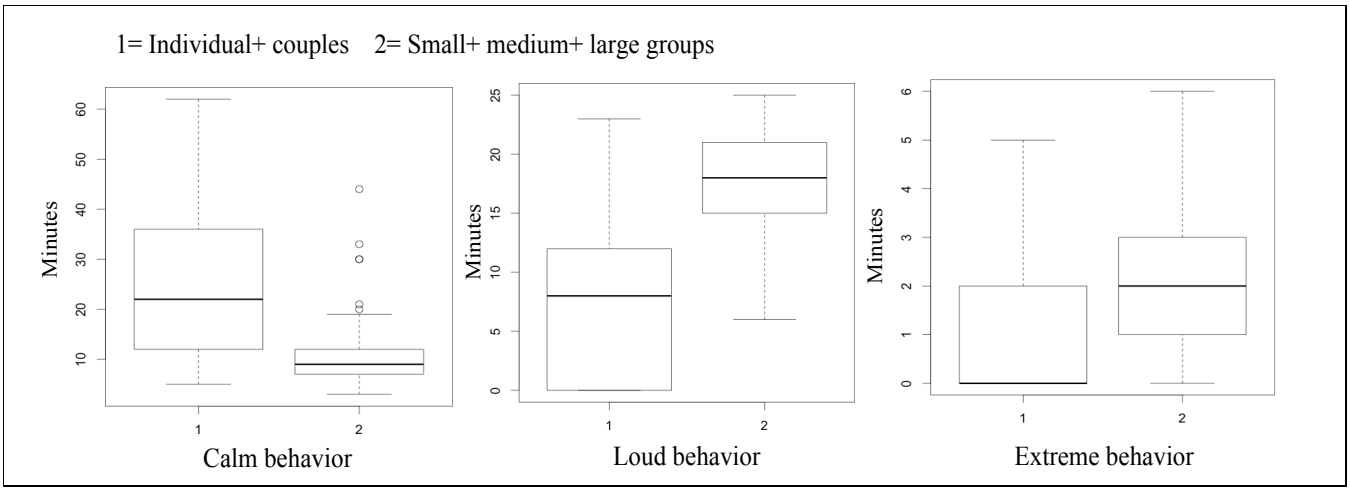


Fig. 4-12 Comparison of behavior between (Individual+couple) and groups

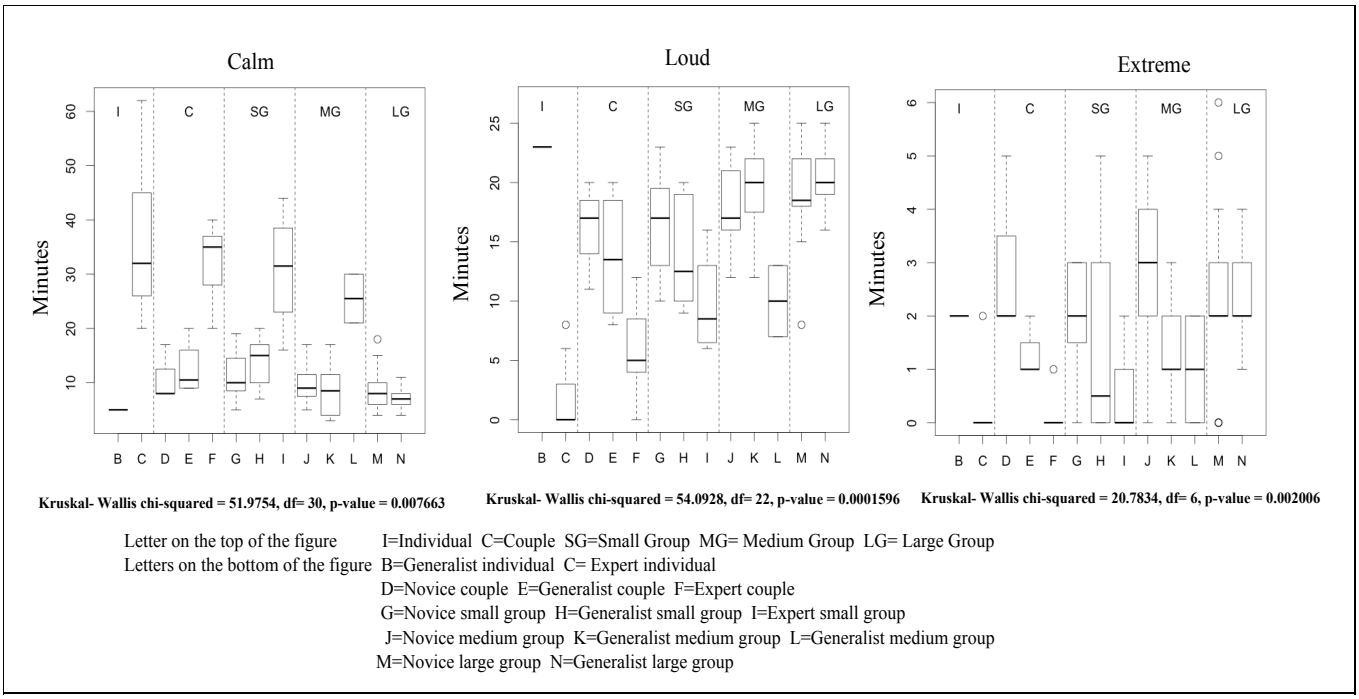


Fig. 4-13 Behavior of the three groups based on the group size

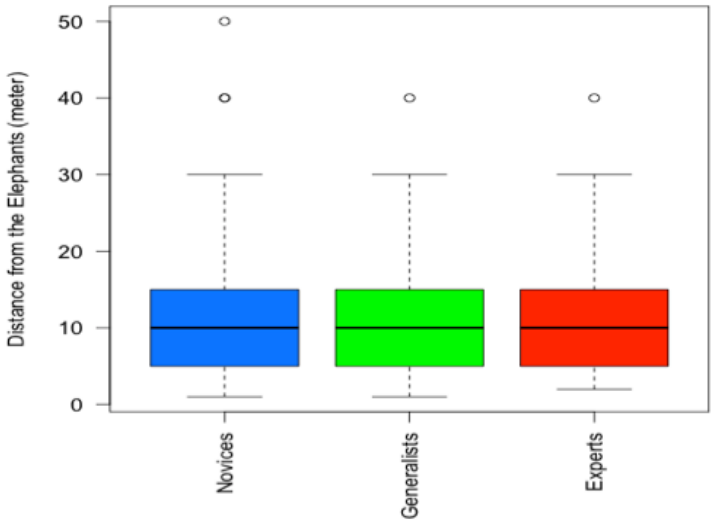


Fig. 4-14 Distance maintained when watching elephants by the three groups

4. Implications for visitor management

In this study, three types of tourists; novices, generalists and experts to a famous elephant-viewing destination could be identified based on their specialization in wildlife viewing. These three groups were further revealed on their orientation towards wildlife values. Most of the tourists were novices or generalists with low or no experience in wildlife watching. Especially, novices considered their visit to the wildlife park as a family outing or being with friends and did not bring useful equipment to explore or study wildlife. Wildlife watching was not their main focus of their trip since their visit to the park was one of several other destinations or not a planned destination. Furthermore, novices were less involved in conservation activities and they placed a high emphasis on utilitarian aspects of wildlife or uninterested in wildlife issues. On the other hand, expert wildlife tourists were well experienced, well equipped and were highly involved in conservation activities. They visited the park mainly to enjoy/study or explore wildlife. They showed a great support for co-existence with wildlife. However expert wildlife tourists represented the lowest number of tourists to this site.

Actual observations of tourist behavior proved the indications of tourist behavior given by the two concepts of tourist specialization and wildlife values as expert wildlife watching tourists stayed calm and less loud or extreme compared to other two groups. Overall, extreme behaviors were low among the three behaviors and also among the three groups. The group sizes of the three types of tourists were different. Larger groups (mainly novices or generalists) displayed more loud and extreme behaviors compared to tourists who come on individual or couple basis (mainly experts). However, there was no significant difference among the three groups in terms of the distance that they watched elephants. All three groups watched elephants at less than 10 meters distance. These results provide important guidelines for visitor management in the park.

The park has an information center to provide visitors with information on the park, and the elephants. There is a system of volunteer guides in the park. However, the information center and the guides provide general information on the park (such as land area of the park, number of elephants) and do not consider the diversity of the tourists to the area. The results of this study showed that the majority

of tourists with less orientation towards wildlife watching on free ranging animals do not value co-existence with wildlife and emphasize on wildlife use for human benefit. Values are the most fundamental factor that directs much of human volitional behavior (Stern & Dietz 1994). This gave an indication that the behavior of less wildlife-oriented tourists may have negative impact on wild animals. The observation of actual behavior of tourists also proved this fact that novices and generalists been the most loud groups. Regardless of the three different types, overall the extreme behavior was very low which can be assumed as a positive control from the current guide system. However all the tourists went very close to elephants during the observations without considering the park rule that says "refrain from getting closer to or disturbing the animals". The park rule also does not specify an exact distance.

There are about 30 guides who are residents from the neighboring villages. They have a good knowledge about the park and wildlife. This knowledge is gained by living in the area for a long time. Department of wildlife conservation provides a brief training about the operation of the department, the legal act of fauna and flora ordinance and interpretation of wildlife. The guides have to accompany the tourists in all the tours and to make sure the tourists adhere to park rules. Guides are employed on a voluntary basis and paid a small daily allowance and most of their income is based on the tips from tourists. "The reliance on tourist tips for income ensures that guides are very keen to please visitors and make sure they gain a good view of wildlife" (Buultjens et al. 2005). This fact was reflected on the results of the distance that tourists watched elephants. During busy days one guide had to direct several groups at once and some groups were not accompanied by a guide. When the guides were not available, the safari jeep drivers or tour operators took the groups inside the park. Most of the drivers were also from the neighboring villages and knew the routes inside the park and places where elephants can be seen. But they had not received any formal training about conservation, interpretation or wildlife from the Department of wildlife conservation.

Thus, interpretations given by the information center and the guides should be revised and developed based on a thorough understanding of the different types of tourists utilizing the park. For example, tourists should not only be given the information on the number of elephants in the park or their

demographic details, but tourists should be informed about the importance of conserving elephants, current issues of elephant conservation and also encouraged to support these conservation efforts. Tourists should be made aware of the park rules. Park rules should be more specific and should give a clear direction to tourists such as a standard distance to watch elephants. More training and funds for park guides are required. The guides depend on knowledge gained from personal experience and need increased formal training to supplement their expertise (Buultjens et al. 2005). The role of drivers should also be taken in to consideration and training should be given accordingly. As Gray (1993) explained, interpretations can raise visitors' knowledge and awareness of wildlife and habitats and thus can encourage pro-conservation attitudes and motivation to act on broader conservation issues. Therefore, understanding visitor characteristics in terms of tourists' involvement, commitment such as specialization and attitudes such as wildlife values along with direct observation of actual behavior provide useful implications for park managers in designing and deciding on their visitor management strategies in order to influence visitor behavior and encourage minimal impacts.

Limitations

There were a number of limitations to this survey, in particular the small sample size, which limited the capacity for more extensive testing of the data. The results discussed in this chapter were based on a sample of 112 tourists. Obtaining participation from tourists for the questionnaire survey was quite challenging in terms of time. Completing the questionnaire required about 10-15 minutes. The only possible time for answering the questionnaire was prior to entering the park while purchasing the entrance tickets and arranging of a guide for each group. At the same time, local tourists were not very used to questionnaire surveys and it was necessary to conduct it in a semi-structured manner. It was difficult to get answers after the elephant-watching excursions because most of the tourists were in a hurry to leave for their next destination. Further, the questionnaire was prepared only in English and Sinhala. There were many foreign tourists, especially German and French tourists who could not understand the two languages

despite of their willingness to participate in the survey. It would be necessary to prepare the questionnaire in various languages and to further simplify the questions in order to acquire more participation.

Plate 4-1 Tourists watching elephants at Udawalawe National Park

(July, 2013)

V. Tourism disturbance on wildlife: case study of elephant watching Tourism at Udawalawe National Park in Sri Lanka

This chapter discusses the occurrence of disturbance on wild elephants due to the elephant watching tourism activities and its impacts on elephant conservation by analyzing the behavioral responses of different age-sex-group classes of wild elephants to tourism activities.

1. Measuring tourism disturbance on wildlife

In assessing tourism-related disturbance, an indicator of human impact is required for analysis. Often effects upon key parameters such as mortality rate and population size are considered to be the ultimate criteria for identifying negative impacts (Nimon and Stonehouse 1995), however, a decrease in population numbers reflects an extreme impact. Increasing attention is being paid to the possible presence of subtle and hidden environmental impacts of tourism such as impact of disturbance (Buckley 2004). The first signs of tourist disturbance on wildlife are behavioral changes, which indicate that the animal has detected the person (Rodgers and Smith 1997, Fortin and Andruskiew 2003, Buckley 2004).

Some behavioral responses of wildlife that represent tourist disturbance are explained in Buckley (2004). One of the most common behavioral responses is alert behavior. The changes of behavior may be obvious such as standing erect and gazing fixedly at the intruder or much subtle such as an animal keeping eye on people while continuing to feed. For species routinely live in social groups, alert behavior may be indicated by changes in the relative position of different individuals, e.g. juveniles moving closer to their mothers or a lead individual moving to the side of the group nearest the tourists or adopting a guard or lookout position (Buckley 2004). Alternatively, alertness may be indicated by changes in vocalization, whether specialized sounds (e.g. between parents and offspring); decreased calling, as for chimpanzees approached by larger tourist groups in Uganda (Grieser-johns 1996) or alarm calls, as for alphine marmot in Europe (Mainini et al. 1993). Another most commonly reported behavioral response to human disturbance, especially by lager mammals in open terrain, is simply to move away such as run and/or hide. These disturbances also depend on the terrain, the type and magnitude of the disturbance, and

the history or habituation of the animals concerned (Buckley 2004). Asian Rhinos in Nepal run if tourists approach within 10m (Lott and MacCoy 1995). Aggression is another behavior that indicates disturbance and it appears to be strongly correlated with feeding (Buckley 2004). Increased aggressive behavior from animals subject to feeding has been recorded, for example, coyote in the USA (Bounds and Shaw, 1994); Dingo in Fraser Island in Australia (Green and Higginbottom 2001); Grizzly bear in Yellowstone National Park (Schwartz et al. 2006), baboons in Tanzania (Wrangham 1974), and Macaque in Thailand (Aggimarangsee 1993). Some of the larger predatory species such as cougar, tiger, lion and leopard, polar bear and leopard seal, alligators and crocodiles may attack humans as prey, however many injuries to tourists by wildlife are from entirely herbivorous species acting defensively when approached such as buffalo, rhino and elephant (Buckley 2004). Therefore, when assessing disturbance it is necessary to identify behaviors that indicate disturbance of the particular species subject to study and aspects such as distance from tourist to animals to show the relationship between disturbance and tourism activity. Altmann (1974) is a widely referred literature up-to-date in many behavioral studies when choosing a sampling method. Therefore, this study used the same literature for the same purpose.

Altman (1974) recognizes the method of direct observation as an important method in behavioral science as it gives insight to ongoing real world situations, and explains several sampling methods to be used in behavioral observations of animals, because it is practically difficult to observe and record all the behaviors of all the members of a social group in the wild. Further, according to Altman (1974), it is usually difficult and also not necessary to record all behaviors of all animals of interest all the time. A variety of sampling methods can be used to obtain a partial record that still provides a valid picture of the behavior targeted. Moreover, behaviors can be classified as either events (instantaneous) or states (durations), Altman (1974) provides an example to show the difference between events and states, when recording animal's sitting posture, an act of sitting that occurs at an instant is an event or that the animal is seated is a state. The choice of behavior as an event or/and state depends on the study. Next, a sample session should be scheduled to begin at a predetermined time and terminate after a fixed period of time. The other task is to decide on the number of individuals per sample session. If all occurrences of

behaviors of interest are recorded for a particular individual during the entire sample period, that individual is referred to as a "focal individual" or there may be a focal sub group ranging from one individual to entire group. The choices among potential focal individual or sub groups can be random, stratified, regular or irregular. Altmann (1974) describes several sampling methods for behavioral studies of animal or humans.

- *Ad libitum* sampling (*Ad lib* sampling)

This method is informal, non-systematic, and often similar to field notes as observer writes down anything that seems interesting. This sampling method may sound thorough, but because the observer can never keep track of everything that is going on, The results of such observations are considered as bias and it is therefore hard to get reliable and quantitative information based on these observations. This method is useful in initial planning for a study, and in deciding what behaviors are important for the animal studied.

- Sociometric matrix completion

In some studies *Ad Lib.* sampling has been supplemented by making additional observations on particular individuals for whom the original sample size was inadequate. The results of such sampling are usually presented in the form of sociometric matrix, which is a contingency table. For example, in an observation of animal fight, the winners are represented by the rows and the losers are by the columns in which a cell indicates the frequency of the interactions. The objective of this method has been to establish the direction and degree of one-sidedness of some relationship such as winner-loser. However, each cell frequency reflects both the effects of the animal's choice among partners in interactions and the effect of attempts by the observer to boost the frequencies of certain cells. As a result, one cannot directly compare each cell with every other cell.

- Sampling all occurrences of some behaviors

The observer focuses on a particular behavior rather than a particular individual. For example, one might count the number of alarm calls given in a group of monkeys during each observation period. This is a useful method for providing the rate of occurrence of a behavior or for studying the synchrony of

behaviors within a group. However, such records are possible only if observational conditions are excellent, the behaviors are sufficiently visible and behavioral events never occur too frequently. This method is applicable for events only.

- Sequence sampling

In this method, the focus of observation is an interaction sequence rather than a particular individual. A sample period begins when an interaction begins and all behaviors under study are recorded in order of occurrence and the sample continues until the interaction sequence terminates. It has problems in selecting sequences and identifying their beginning and end. Sequence sampling can be used for both events and states.

- One-Zero sampling

In this method, in each sample period, occurrence or non-occurrence of a behavior rather than frequency is recorded. The scoring is easy but it ignores various data such frequency and duration. It is usually used for states.

- Instantaneous and scan sampling

In this method, the observer records an individual's current activity at preselected moments in time. It is a sample of states, not events. It can be used to obtain data from a large number of group members, by observing each in turn. The observer should scan each individual for the same brief period of time. For this reason, it is more suitable for studies on non-social behavior or to situations in which social behaviors can be lumped into a few easily distinguished categories. An animal's activities are recorded at pre-selected moments (e.g., 1 minute). If the behaviors of all members of a group are surveyed within a short period of time, we call it scan sampling. This provides data on the distribution of behavioral states in a group. Instantaneous or scan sampling is best done with a sample interval as short as possible, and with behaviors that are very easily identified. The behaviors should ideally be relatively long compared to the sample interval. It is an excellent method for collecting a large amount of data on a group of animals.

- Focal animal sampling

In this method, all occurrences of specified (inter) actions of an individual, or specified group of individuals, are recorded during each sample period, and a record is made of the length of each sample period and, for each focal individual, the amount of time during the sample that is actually in view. This is a widely used method in behavioral observations. Some concerns about focal sampling include difficulty in estimating the rate of interaction between animals and observing several animals simultaneously. In field research, it is not always possible to recognize individuals. Under those conditions, a focal animal sampling can be carried out by randomly choosing among visible individuals as long as it is possible to keep track of him. This method provides relatively unbiased data. The method can be applied for both events and states. Here, all occurrences of specified actions of one individual are recorded during a predetermined sample period (e.g., one hour). The observer also records the length of the sample period, and the amount of time the focal animal is in view ("time in"). This method can provide unbiased data relevant to a wide variety of questions, particularly if animals remain in the field of view.

"There are methodological and statistical problems associated with all these techniques, and the method chosen will usually be a compromise between observation conditions, absolute accuracy, complete independence and sample sizes" (Moss 1996).

The best technique for sampling animal behavior is to make a continuous recording of the selected behaviors from a specific individual, which is the Focal Animal Sampling method (Moss 1996). As described earlier, in this method, a single animal is chosen, and a record of its behavior is made for a specified period of time. The subject must be relatively easy to identify, to locate and to remain with during the sampling period. These requirements limit the applicability of this technique in many studies of elephants. However, focal animal sampling can be extended to groups or age/sex classes. The principle of this technique is to remain with and record behavior from a specific sample group, for example a family unit, at established intervals for a set length of time. Again, the period of time chosen for the focal sample needs to reflect the possibility of observing the behavior of interest during that sample. A focal

sample designed to examine feeding could be as short as ten minutes, if feeding occurs every two to three minutes. However, if the behavior of interest is rare, such as play, then samples of several hours duration may be necessary in order to pick up the behavior. Within the focal sample, behavior can be recorded either only at specified intervals during the sample, such as every five minutes for a one-hour period, or continuously throughout the specified period.

2. Directions for observation of elephant behavior

Moss (1996) describes some important factors that should be considered in behavioral observations of elephants in the natural environment based on African elephants. Four main factors are described below.

First it would be necessary to recognize demographic factors such as different age-sex classes of elephants when choosing individuals for the study because the behavior may differ accordingly. There are several methods for identifying elephants, ranging from recording the births of individuals to estimates based on appearance. Birth registration along with individual recognition is considered as the most accurate method of collecting demography data, but it requires a long-term approach. For example, the Amboseli Elephant Research Project in Kenya is known as the longest study of elephants in wild aiming to follow the life history of each animal. By 2006 there were 1778 known elephants. A method of ageing a dead elephant is by its teeth. During an elephant's lifetime it acquires six sets of molars, each of which comes in at a certain age and wears down at a certain rate (Roth and Soshani 1988 on Asian elephants). Age estimates can also be made based on shoulder height back length and footprint length (Western et al. 1983; Lee & Moss 1986; Lee & Moss 1995). When its difficult to use such techniques, the estimation of the ages is made based on elephant's size, physical development, tusks, body shape etc. "Elephants grow throughout their lifetime, the larger an elephant is, the older it is" (Moss 1996).

Secondly it would be necessary to use individual recognition of elephants in the study. Moss (1996) explains that there are many aspects of elephant ecology and behavior that would be difficult or impossible to study without knowing individuals. For example, to study about the ranging patterns of individuals or groups, or to find out social relations in order to say something about who was affiliated

with whom or who was dominant to whom, it would be necessary to know them as individuals. However, individual recognition is difficult if the population size is very large. In such cases it would be practical to identify just the adults or maybe just one or two adults from each family unit and maybe only the large adult males. Further, if the habitat is a difficult one in which to observe elephants, such as forest or dense shrub, it might be difficult to use the individual recognition method. Moss (1996) states that similar to humans, "no two elephants are alike" as there are distinct individual characteristics. Douglas-Hamilton (1972) introduced a method of recognizing individual elephants by their ears. Elephants usually have holes, nicks, and tears on the edges of the ears. In addition, the veins in the ears are often prominent and the pattern they form is unique, similar to human fingerprints, and a lot easier to see. These studies recommend photographing of individuals for recognitions. Three photographs for each individual are suggested along with notes on specific physical features and IDs for the individuals (one photograph of the left ear and tusk, one of the right ear and tusk, and one head-on showing the tusk configuration. If the elephant has scar tissue, lumps, deformities or oddities in body shape then it would be necessary to photograph the whole body).

Third, it is necessary for the observer to define the behavior that the study focuses to research. There are number of ways to define a behavior of an animal. Behavior can be defined by its actions, its outcome or its context. "It is important that categories of behavior are mutually exclusive, each action or outcome is used only in a single definition, they should be easily replicated both by the same observer in separate observations and by different observers, and finally, the categories should be limited in number in order to reduce errors leading to unreliable data collection" (Moss 1996).

Fourth, sampling protocol is considered highly important in animal behavioral observations. It could be Random sampling when the animals are easy to locate or non-random sampling that maximizes data collection in a given period of time.

3. Observation of elephant behavior in relation to elephant watching tourism

Chapter three revealed different types of tourists to Udawalawe National Park (UWNP) and their behavior. Majority of the tourists to the park were novices or generalists with low or no experience in wildlife watching and orientation towards wildlife issues. Therefore, they tended to focus on utilitarian aspects of wildlife for human benefits. Tourists were talking most of the time during wildlife watching and moreover, regardless of the levels of expertise in wildlife watching, all the tourists observed elephants at very close distances during the tours. These results indicated that there is a high possibility of elephants getting disturbed by the tourism activities.

Wild elephant population in Sri Lanka has decreased from 12,000 (McKay 1973) to 3000-4000 elephants (Zubair et al. 2005). The ongoing human-elephant conflict in agrarian communities has become a significant threat to the population viability of Sri Lankan elephant (Ranaweerage 2012). Several protected areas are created as important habitats for wild elephants along with other wildlife, and allows tourism as a mean of funds for conservation and management. Consumptive wildlife tourism such as hunting and fishing is prohibited in protected areas in Sri Lanka. However, non-consumptive wildlife tourism such as wildlife watching is widely encouraged and promoted. Elephant watching is the main attraction of majority of the protected areas in Sri Lanka. This type of tourism is expanding (see chapter 3 for details) and tourism pressures on wildlife in protected areas in Sri Lanka are of high concerns for environmental sustainability. Buultjens et al. 2005 describes tourism effects such as over crowding and pollution in a famous national park in Sri Lanka (Box 3-2). The current paper focuses on a more subtle aspect, tourism disturbance on elephants based on behavioral responses of elephants to tourists, which can further become a threat to the well being of this threatened species.

The main consequences of disturbance are a change in the time-budget of individuals, notably through reduced feeding time, while energy expenses linked with escape movements may become very high (Beale 2007). Elephants being mega herbivores require large amount of food and water and spend most of their time feeding (De Silva and De Silva 2007). Sri Lankan elephant eats about 150kg of vegetation per day, which is about 3 to 5% of its body weight by spending 17 to 19 hours per day feeding

(Samansiri and Weerekoon 2007, Vancuylenberg 1977). Feeding is significant since large herbivores must spend a high percentage of their day feeding to remain healthy (Stockwell and Bateman 1991). Therefore, disturbance on feeding can be considered detrimental on the well being of elephants.

This study observed elephant behavior in relation to elephant watching tourism activities in order to identify tourism disturbance on free ranging elephants focusing on feeding activity of elephants. The study was conducted at UWNP in southern part of Sri Lanka (see chapter 2 for study site description). Four types of elephant behaviors; alert, fear, stress and aggression were chosen as indicators of disturbance on feeding elephants because each behavior had a cost on feeding. "Alert" was defined as gaze fixedly at tourists, pretend to eat while keeping an eye on tourists, or adopt a guard or lookout position. 'Fear' was defined as move backwards or run away or/and run towards group or hide or gather together. "Stress" was when elephants flap fast, toss soil, repetitively sway the head and shoulders, even the whole body from side to side while standing in one place or circling. 'Aggression' was defined as charge towards the tourists, attack tourists or vehicles, break branches of trees or fall trees. These definitions were based on personal observations of elephants in both captive and natural environment prior to the study, and in reference to previous ecological studies of elephants in Sri Lanka (De Silva and De Silva 2007, De Silva 2010). Thirty minutes continuous focal animal sampling was initiated to record the frequency and length of the selected behaviors along with several assumed causes of disturbance related to tourism. The sample period of thirty minutes was decided based on the average elephant watching time of tourists, which was about 15-20 minutes per elephant group. Frequency of behavior was the number of occurrence of each behavior during a sample period and length was the duration that a behavioral indicator of disturbance lasted (For example alert duration means the time from the occurrence of an alert behavior until returning to feeding behavior or another behavior such as aggression).

Assumed causes of tourism related disturbance for this study included tourist behavior, distance, number of vehicles, vehicle sound and some other factors such as time of the day and the season in which tourism activities took place. Tourist behavior was categorized into three types: calm, loud and extreme (also see chapter 3). When there were several groups watching the same elephant or elephant group, the

behavior of the group closest to the elephant/s was counted. If two or three tourist groups were watching the elephants at the same distance, the most prominent behavior was selected. For example, if one tourist group was calm and the other tourist group was loud, the behavior was marked as loud. Distance between tourists to elephants was measured using a laser range finder. When there were tourists watching the same elephant/elephant group at different distances, the distance from the nearest vehicle to the elephant/elephant group was measured. The number of tourist vehicles was not fixed and could not be controlled, as there were cases where vehicles arrived and left at different times within one sample. In such cases, the arrival and departure times of the vehicles were recorded. Whenever an elephant displayed a disturbance behavior (alert, fear, stress or aggression), number of vehicles at that point was recorded at each occurrence. Vehicle sound was categorized as whether the engine of the vehicle was on or off. Time of the day was divided in to four categories as 06:30-9:00h, 09:00-11:00h, 14:30-16:00h and 16:00-18:30h. Mid day was the highest peak of temperature and there weren't much feeding as elephants generally rest during this peak hot times of the day, thus avoided in the observation. The season was classified as dry or wet based on the monthly rainfall data of the area. There are several vegetation types in the park such as forest, scrubland and grassland. The observation of elephant behavior in relation to tourist activities was only possible in open grassland that allowed clear visibility of both elephants and tourists. Observations were conducted on a vehicle (during park operation hours from 0600h to 1830h) because the park did not have any watch posts or allowed getting off the vehicle. Random selection of feeding elephants in a no tourist situation was first chosen for observation. Individual elephants of different sex-age classes were targeted. Male and females could be identified from the sexual organs and body shape. Males, especially adult males have a long body with a downward slant at the back and females have a flat or box shaped body. Age was identified by the body size and in comparison to an adult female. Five age categories were used in this study, which include Newborns, Infants, Juveniles, Sub adults and Adults. Newborns could pass beneath the forelegs of an adult female. Infants were taller than newborns and were tall up to a chin of an adult female. Juveniles were half the size of an adult female. Sub adults were close or same size as the height of an adult female, yet developing the secondary

organs. Adults were large in body size and the secondary organs were well developed (for example, enlarged breasts in adult females and prominent humps on head in adult males). The age classes chosen for this study was adult male (plate 5-2), adult female (Plate 5-3), sub adult male (Plate 5-4) and sub adult female (Plate 5-5), as it was difficult to observe behavior of younger elephants such as juvenile infants (Plate 5-6) or new born (Plate 5-7) because they tended to be in between the adults or covered by a group most of the time. A "group" was considered as individuals within visual range of the observer (up to 500m) who shared resources or moved together. Male group categories include solitary, male pair (plate 5-10), male group (plate 5-11) and mix group. Female group categories include small cow-calf group to very large cow-calf group and mix group (plate 5-12 to 5-14). If it was a male group of adults and sub adults, at least one adult and sub adult were selected. If it was a cow-calf group, at least adult female or sub adult female were selected. If it was a mix group at least one male and one female were selected. Obtaining a balanced number of samples for different age-sex-group classes of elephants were the aim of this selection. However, the selection was also dependent on the composition of the group and the levels of visibility for observation. If two individuals were selected, two observers conducted the recordings of behavior simultaneously. Videotaping or photographs of elephants were done in order to individually identify the elephants by focusing on various physical features of elephants (Table 5-1, also see plate 5-1a to 5-1d). Observation of elephant behavior was done in the presence as well as absence of tourists. When an individual elephant was selected (in a no tourists scenario), tourist arrival was waited to record the behavior. Samples for the presence of tourist started as soon as tourists stopped the vehicle to watch the focal elephant/s. "Absence of tourist" means when only the research vehicle was available. The research vehicle was driven carefully to create a no tourist situation and 100-150 meters distance from elephants was maintained except few occasions of 50-100 meters. Minimum of one-hour interval was kept between samples. Observations were done during the period of January 2013 to August 2013.

Statistical analysis

Wilcoxon rank sum test was applied to examine whether a difference of elephant behavior in the presence vs. absence of tourists existed as well as to determine a difference among male and female behavior in the presence vs. absence of tourists. Kruskal-Wallis rank sum test was used to determine differences of behavior among different age classes as well as group types of elephants in the presence vs. absence of tourists. Fishers exact test was performed to determine any significant association between each assumed causes of disturbance (Tourist behavior, distance, vehicle sound etc.) and the elephant behavior. Binary Logistic Regression was used to compare occurrence and non-occurrence of four types of elephant behavioral responses with the assumed causes of disturbance and to determine the most influential factor/s on elephant behavior among all of the assumed causes of disturbance in the study. Software used for the analysis of this chapter was R (ver. 3.1.0) except for Binary Logistic Regression, which was conducted on Minitab (ver. 14.0).

Table 5-1 Features used to identify elephants individually

Ears	Earlobes	Tail	Backbone	Other
Hole	Long	Long	Straight	Wounds
Tear	Square	Short	Raised	Growth
Notch	Wedge	White hair	Sunk	Forehead profile
Top curl (forward, backward)	Curve	Crooked		Depigmentation
Flap (forward, backward)		Broken (at base, middle, tip)		
Plain				
Long				
Veins & depigmentation				

(Source: De Silva 2010)

Plate 5-1a Different ear features of elephants used for individual identification

Plate 5-1b Different body shapes of elephants used for individual identification

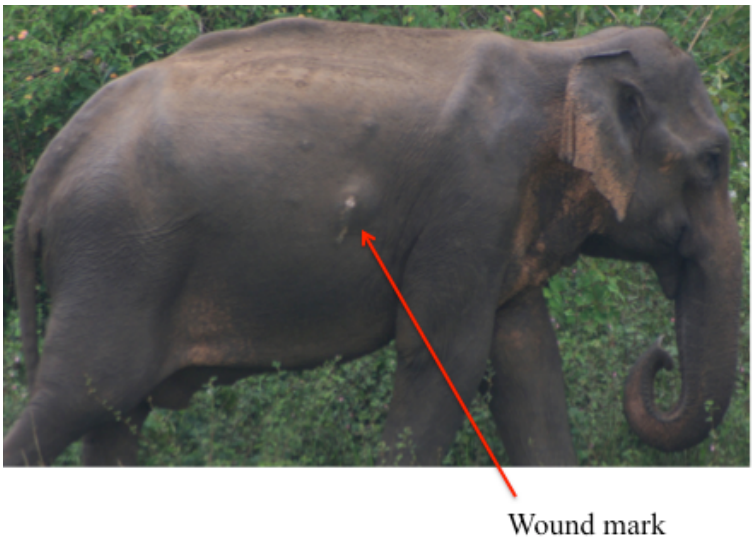


Plate 5-1c Example for a body mark of an elephants used for individual identification

Plate 5-1d Examples of different tail features used for individual identification

Plate 5-2 Adult male elephant in Udawalawe National Park

(May, 2013)

Plate 5-3 Adult female elephant in Udawalawe National Park
(May, 2013)

Plate 5-4 Sub adult male elephant in Udawalawe National Park

(June, 2013)

Plate 5-5 Sub adult female elephant in Udawalawe national Park

(March, 2013)

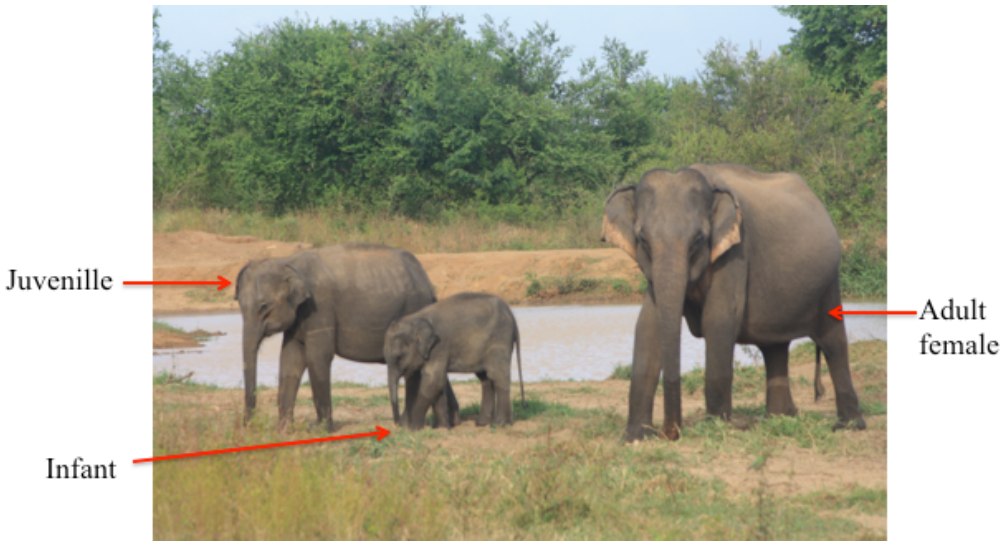


Plate 5-6 Adult female, infant and juvenile in Udawalawe National Park

(May, 2013)

Plate 5-7 Adult female and a newborn in Udawalawe National Park

(March, 2011)

Plate 5-8 An adult male and a sub adult male in Udawalawe National Park

(March, 2013)

Plate 5-9 An adult female (on the right) and a sub adult female

(May, 2013)

Plate 5-10 Male pair Udawalawe National Park

(May, 2013)

Plate 5-11 Male group in Udawalawe National Park

(July, 2013)

Plate 5-12 Small Cow-calf group in Udawalawe National Park

(May, 2013)

Plate 5-13 Medium cow-calf group in Udawalawe National Park

(May, 2011)

Plate 5-14 Large cow-calf group in Udawalawe National Park

(July, 2013)

4. Behavioral responses of elephants to tourists

Total of 87 individual elephants were observed in which 40 elephants were males (19 adult males and 21 sub adult males) and 47 were females (28 adult females and 19 were sub females).

There was a significant difference in all four behavioral responses as a whole and each separately in the presence versus absence of tourists in terms of frequency of behavior (Fig. 5-1 and Fig. 5-3) as well as duration of behavior (Fig. 5-2 and Fig. 5-4, also see Table 5-2 for significance values) except for duration of Fear behavior. The difference was that elephants showed more alert, fear, stress and aggressive behaviors in the presence of tourists compared to the situations where there were no tourists. Among the four behaviors, alert was the most frequent (61%) and fear was the least frequent behavior (7%). Other two behaviors; stress and aggression were 19% and 13% of the total number of behaviors.

The occurrence of behaviors was compared among different sex-age classes of elephants. The observed sex-age classes were adult female elephants, adult male elephants, sub adult female elephants and sub adult male elephants. Male elephants showed more alert, stress and aggressive behaviors compared to female elephants, especially stress and aggressive behaviors were significantly different (Fig.

5-5 for frequency, Fig. 5-6 for duration and Table 5-3 for significance values). Fear was observed more often in females than males but the difference was not statistically significant both in terms of frequency and duration. Even though the male elephants frequently alert than the female elephants, they returned to normal behavior (feeding) faster than the females, on the contrary, females may not show much alert compared to males, but when they showed, it took long to recover (Table 5-4 for No. of alert and duration). This was consistent in the comparison of age classes (Fig. 5-7 and Fig. 5-8). Fear behavior could be observed more in young elephants both in males and females. Further, the alert durations were longer in young males than of adult males. However, there was no statistically significant difference in overall behavior among the sex-age categories, especially in terms of frequency of behavior. Male elephants live on solitary basis, as male pairs, male groups or in mix groups (with female elephants). Female elephants live in cow-calf groups or in mix groups. Group sizes of cow-calf groups varied from small groups (mother-calf group) to very large groups (Over 15 elephants). Mix groups observed in this study were generally large groups over 6 elephants. Largest male group observed was a group of 8 males. It was important to see whether elephants in different group types responded differently because it can help in tourism planning and minimizing impact. The analysis of adult male elephants in different groups showed that adult males reacted differently to tourists in different group types (Fig 5-9). For example, the number of behavior in adult males in male groups or mix groups was higher than adult males that lived alone (solitary). However, the occurrence of the four behaviors was considerably low in the absence of tourists (Significance in the difference presence of tourists vs. absence of tourists Kruskal-Wallis rank sum test p-value = 1.372e-13). Male elephants tended to change their groups quite often. Therefore, there were cases where same male elephant was seen in different groups at different times, for example one adult male was first sighted as solitary, after a week it was seen in a male group, after another few days in a mix group and the behavior was different at each sighting. Changing groups was not found in females during the study period. However, there was a difference in females according to the group type. For example, sub adult females in smaller groups showed higher number of behaviors compared to females in

large groups (Fig. 5-12). The comparison of behavior among different group types for each behavior type and overall behavior is shown in table 5-5.

Overall, alerts were the shortest (average alert length 3 minutes) and aggression was the longest (average aggression length was 7 minutes) in terms of duration. Consequently, return from alert to feeding was faster than from aggressive. Aggression had negative impact not only on elephants in terms of their feeding time, but also on tourists as aggressive elephants were trying to attack the tourist vehicles which was a risk factor for tourists. In the presence of tourists, elephants spent 47% of the total observation time (142 hours) on alerts, fear, stress and aggression. In other words, feeding time was decreased to half of the time observed in the presence of tourists. On the contrary, in the absence of tourists, only 6% of the time was spent on alert, fear, stress and aggression out of the total observation time of feeding elephants (118 hours).

Further, four behaviors of elephants were compared with each assumed causes of disturbance to find out the significance of each cause to elephant behavior by using Fishers exact test. These included tourist behavior (calm, loud, extreme), distance (1-5m, 6-10m, 11-15m, 16-20m, 21-30m, 31-50m) time of the day (6:30-9:00h, 9:00-11:00h, 14.30-16:00h, 16:00-18:30h), the season (wet or dry), vehicle sound (Engine on/off) and the number of vehicles. Tourist behavior was significantly associated with elephant behavior (Fisher's exact test for significance p-value = 0.0004998). When tourists were calm, elephants didn't change their feeding behavior much, even if they changed it was mainly alerts. Alerts, fear, stress and aggression increased when tourists were loud or showed extreme behaviors. Aggressive behavior didn't occur when tourists were calm. However, any difference could not be found between elephant behavior and tourist behavior based on the sex of elephants (p-value = 0.4163) or age categories (p-value = 0.4163) or group types (p-value = 0.5912), which means overall all the elephants react to tourist behaviors in a similar pattern. The distance was also highly related to elephant behavior (Fisher's exact test for significance p-value = 0.0004998). Close distances such as less than 10 meters were associated with higher number of behaviors indicating disturbance to elephants compared to long distances. Both males and female elephants showed this pattern in their responses related to distance (Fig. 5-15) yet males

showed more disturbance behaviors than females to distance (p-value = 0.0004998). Similarly, there were some differences in the age categories where adult males and sub adult males showed greater responses especially compared to sub adult females (Table 5-6). There wasn't much difference in the group categories for distance (Table 5-7). Further, sound of the vehicles also affected on the elephant behavior as the frequencies of behaviors increased when the engine was kept "on" during elephant watching compared to engine off scenario (Fisher's exact test for significance p-value = 0.0004998, also see Fig. 5-16). No difference was found when compared behavior and vehicle sound based on sex (p-value = 0.4641), age (p-value = 0.5027) or group types (p-value = 0.7076). Time of the day was also an influential factor (Fisher's exact test for significance p-value = 0.0004998, also see Fig. 5-17) to elephant behavior as there was more number of behaviors in the morning hours compared to afternoons. A significant difference could not be found between males and females (p-value = 0.09045) or age categories (p-value = 0.2479). However, some differences were found among different group types, especially the behavior of mix groups were significantly associated with the time of the day compared to group types such as solitary elephants or male pairs (Table 5-8). Further, no significant association among elephant behavior and the number of vehicle (Fisher's exact test for significance p-value = 0.2519) as well as elephant behavior and the season (Fisher's exact test for significance p-value = 0.3733) was found.

The overall comparison of assumed causes of disturbance with elephant behavioral responses using binary logistic regression showed tourist behavior (loud and extreme), close distance, vehicle sound (keeping the engine on) and the time of the day as the significant factors associated with the four behavioral responses of elephants indicating disturbance, among which tourist extreme behaviors and vehicle sound could be identified as the most influential factors associated with disturbance (Table 5-9). Having positive coefficients for Tourist behavior and vehicle sound on implies the higher levels of the each covariate more associated with elephant behavioral changes to happen. Odd ratios corresponding to "loud" and "extreme" of tourist behavior covariates indicate that elephants under "loud" and 'extreme" conditions tend to change their behavior from feeding to alert, fear, stress or aggression. When other variables were held constant and the tourist behavior was loud (2), the elephant behavior was 10 times

more likely to be a 1 (behavioral change) than a 0 (normal-feeding). Further, when other variables were held constant and the tourist behavior was extreme (3), the response, the elephant behavior was 91 times more likely to be a 1 (behavioral change) than a 0 (normal-feeding). The change in elephant behavior was also high under the condition of vehicle sound. The odds ratio for vehicle engine-on was 132.57. With everything else held constant (other predictor variables are fixed), for a situation that the vehicle engine was on, the model predicted an increase of 132.57 in the odds of the response being a 1 to being a 0. In other words, when the vehicle engine was on, it was 132 times more likely that elephants change their behavior from normal feeding to alert, fear, stress or aggression. The negative coefficients for time and distance showed the association of these two covariates with the normal feeding behavior of the elephant. Elephants tended to show disturbance indicators mostly in the morning than in the afternoon. There was 27% decrease in the odds of elephant behavior against the elephant's normal condition when the time changes from morning to afternoon, while other covariates were unchanged. Having negative coefficient for covariate distance implied that the elephant behavioral change was high under low distance situations. The odds of elephant behavior against the normal conditions, decreased by 7% when the distance changes from level 1 (1-10m) to level 2 (11-20m) and further decreased by 4% when the distance changed from level 2 (11-20m) to level 3 (21m<).

5. Implications for mitigating disturbance

The results of the elephant behavioral observations showed a clear difference in elephant behavior in the presence versus absence of tourists. When tourists were present, alert, fear, stress and aggressive responses of elephants were significantly high. Increase in these behaviors occurred at a cost of decreased feeding time, which indicated disturbance of tourist presence on elephants. This pattern was found similar in the analysis of behavior in different age-sex-group classes of elephants in the presence versus absence of tourists. However, there were some differences among different age-sex-group classes of elephants. For example, adult males showed more aggressive behavior than adult females. However, adult male behavior differed among different male group types. Adult males in male groups or mix

groups were more vulnerable for disturbance than solitary males. The reason for such differences can be explained based on the reason for why male elephants create male groups or join cow-calf groups. A recent study on social structure of male elephants at UWNP identified that male associations are mainly related to musth (which is a period of sexual activity in male elephants) and gaining access to oestrous females. This could be the reason for adult male elephants in groups to be more sensitive to the presence of tourists and vulnerable to tourism disturbance.

Further, some tourism related causes of disturbance could be identified. Tourist behavior had a high impact on elephant behavior as the behavioral responses (which were use as the indicators of disturbance) increased when tourists talked or showed extreme behaviors compared to when tourists were calm. Another factor is the vehicle noise. The sound of the engine disrupted elephants significantly. Further, close distances such as less than five or ten meters also caused disturbance to feeding elephants. Elephants were found more vulnerable to disturbance in morning hours that afternoon. Number of vehicles did not show a significant association with elephant behavior. During the study period, the largest number of tourist vehicles at one elephant/elephant group was five vehicles. Elephants showed alert only to the first vehicle and the second vehicle in most cases. However, if the third vehicle arrived after a long time gap from the second vehicle, elephants appeared to be on alert of the vehicle. However, this differed among individuals.

In this park, elephants are often assumed as well habituated to tourists. However, the results of this study showed behavioral changes of elephants indicating disturbance due to tourism activities. Certain age-sex-group categories were highly prone to disturbance. These factors were not much considered in the current tourism planning. It is important to monitor elephants in relation to tourism activities to further understand these differences. As discussed in chapter four, it is important to guide tourists carefully not to cause disturbing behaviors to elephants such as talking during elephant watching tours. Park rules should be specific in terms of distance to watch elephants. Majority of tourists observed in this study was reported to watch elephants at less than 10 meters distance. The current park rule regarding the distance did not specify a distance to watch elephants, and simply stated not to get closer to

elephants. This study only recorded whether the engine of the vehicle was on or off after a tourist group arrived at an elephant or elephant group. However, vehicle noise could be heard from far and can cause disturbance even before tourists actually arrive at elephants. Different types of jeeps were used for tours and some were badly maintained. The condition of the tourist jeeps should be considered before allowing to be used for tours inside the park. Time of the tourist activity was also observed as influential on disturbing elephants. During the early morning hours elephants appeared more disturbed compared to evenings. Park opening hours were from 06.30 a.m. to 06.30 p.m. Tourism activities began in the morning hours and elephants tended to be highly sensitive to tourists and tourist activities at this starting point than the afternoon. It is important to consider these factors in mitigating tourism disturbance in the park.

Some organizations and tour operators along with wildlife authorities in Sri Lanka have taken some initiatives to discuss these issues. For example, a list of "Dos and Don'ts" for elephant watching tourism were developed (See Box 5-1) during a workshop held by Born Free Foundation (UK based international wildlife conservation group) in conjunction with Jetwing Travel (a leading tour operator in Sri Lanka) and the Department of wildlife Conservation in Sri Lanka in order to educate tour guides, trackers, jeep drivers in two parks, Minneriya and Kaudulla on the damage done to wildlife as a result of their irresponsible behavior. "The lists are not comprehensive, but address the most common and most disruptive problems encountered in the experience of the workshop participants" (Born Free Foundation per comm.). This type of communication among stakeholders is valuable in understanding the issues from different perspectives. It is also important to encourage scientific research on the impacts of tourism on wildlife to further support decisions in tourism planning in wildlife areas. As shown in this study, behavioral responses of wildlife to tourism can provide useful guidelines for mitigating tourism impact on wildlife that are of high concern in Sri Lanka today.

Limitations

Behavioral observations of elephants were only possible in open grasslands and could not be conducted in different habitat types such as shrubs due to the difficulty in observing elephant behavior in

such areas (See plate 5-15a and 5-15b). As a result, behavior could not be compared among different habitats or spatial aspects of the problem could not be revealed. It was difficult to observe the behavior of young elephants such as infant or newborns because they tended to stay in between adults or covered by adults. The recordings of juvenile elephants was also very few and could not be used in the analysis. Tourist group size was also considered as a cause of disturbance, however due to the many incomplete data recordings, it could not be included in the analysis. Tourists who were seen talking were recorded as loud without a measurement for voice level. Vehicle sound was only revealed based on the engine sound (engine on or off) during elephant viewing by tourists. However, vehicle sound may impact even before the tourists arrive in the vicinity of elephants. Different groups of elephants in the same area could not be compared in this study. For example, whether there was any effect from one disturbed group on another another group foraging in the same area (even though they may be away from tourists) could not be revealed. At the same time, this was a short study of seven months. The observations could not be conducted daily during the seven months. On average, observations were conducted for 12 days a month, four hours a day. The study period may not be enough to make assumptions especially related to seasonal comparison of behavior. A long-term study of this nature can provide more useful insight to the problem.

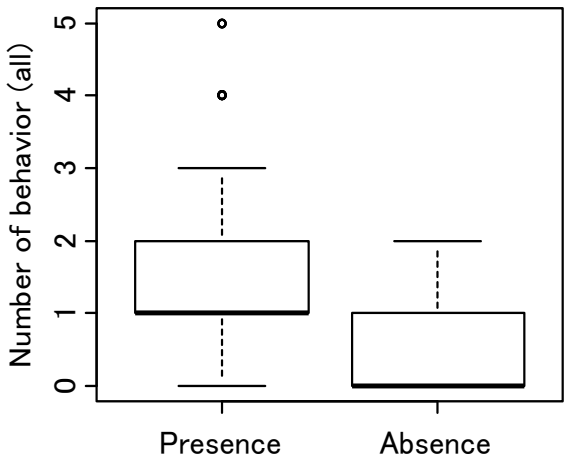


Fig. 5-1 Frequency of overall elephant behavior in the presence vs. absence of tourists

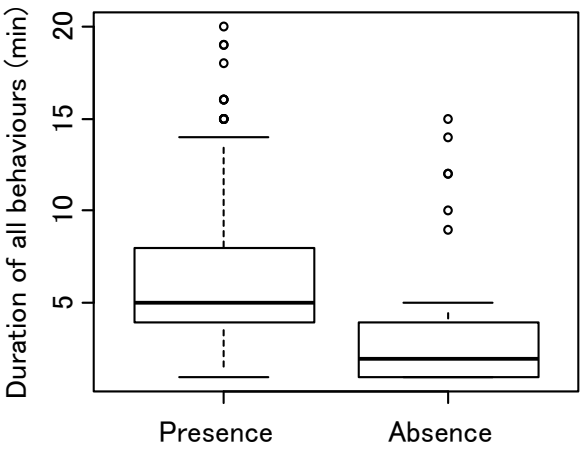


Fig. 5-2 Duration of overall elephant behavior in the presence vs. absence of tourists

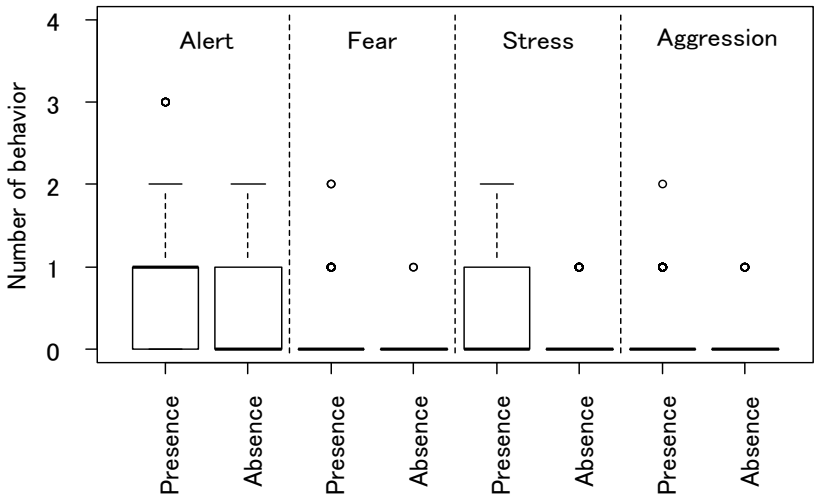


Fig. 5-3 Frequency of each behavior in the presence vs. absence of tourists

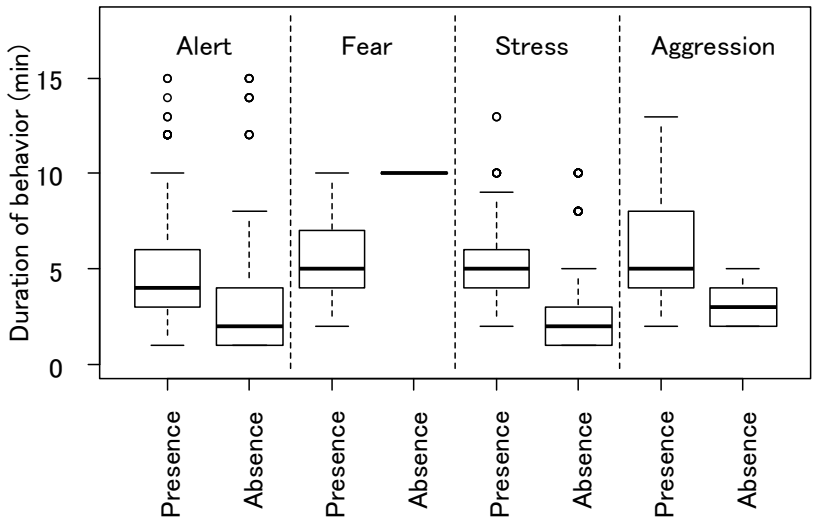


Fig. 5-4 Duration of each behavior in the presence vs. absence of tourists

Table 5-2 Comparison of elephant behavior in the presence vs. absence of tourists

	Wilcoxon rank sum test p-value	
Behavior	No. of behavior	Duration of behavior
Alert behavior	8.24E-13	3.81E-06
Fear behavior	0.000128	0.120900
Stress behavior	0.000432	0.000364
Aggressive behavior	2.82E-06	0.008849
Overall behavior	2.20E-16	5.98E-14

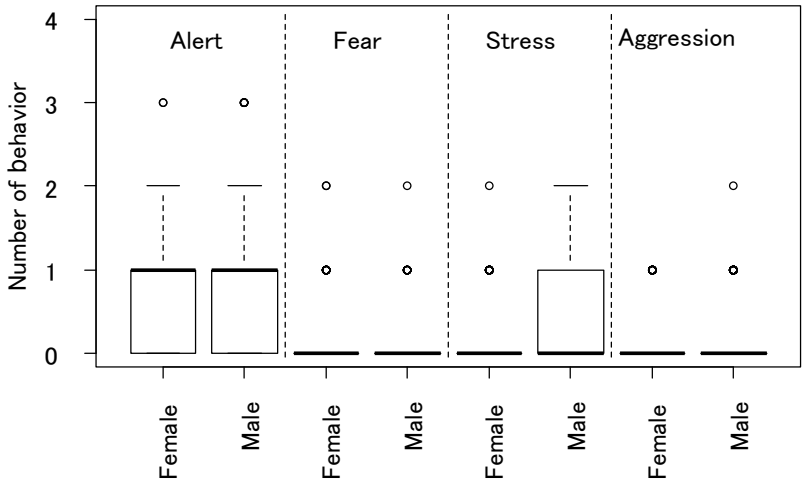


Fig. 5-5 Frequency of behavior of female vs. male elephants

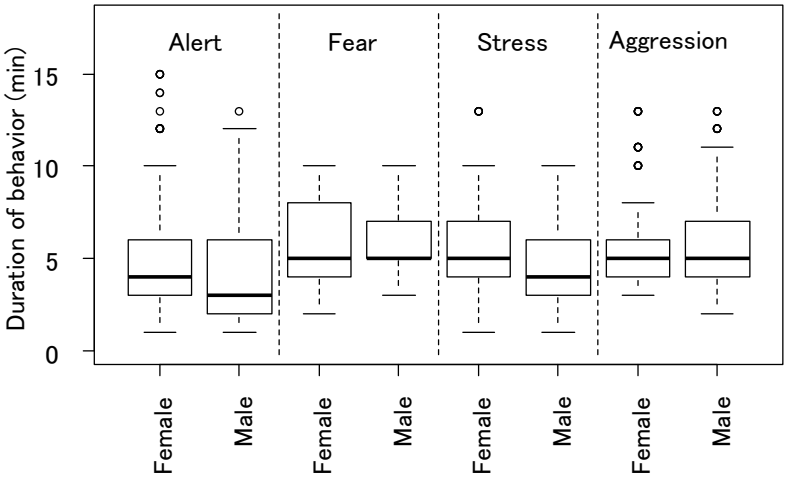


Fig. 5-6 Duration of behavior of female vs. male elephants

Table 5-3 Significance of difference-female behavior vs. male behavior

Wilcoxon rank sum test P-value		
Behavior	No. of behavior	Duration of behavior
Alert	0.3842	0.0027
Fear	0.3979	0.8243
Stress	0.0012	0.0620
Aggression	0.0220	0.7838
Overall	0.0202	0.0321

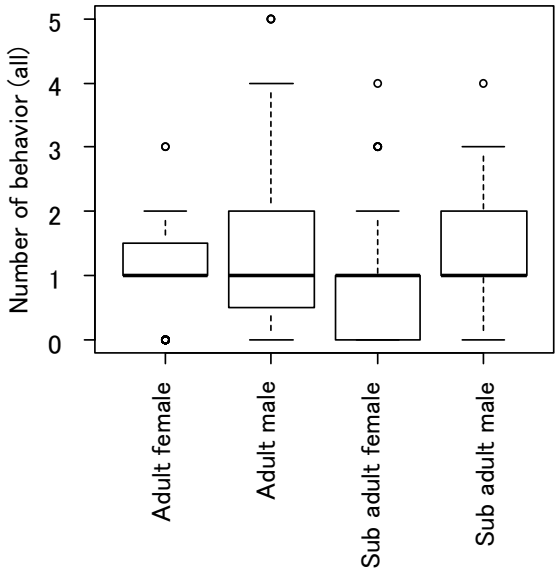


Fig. 5-7 Frequency of behavior based on age-sex classes of elephants

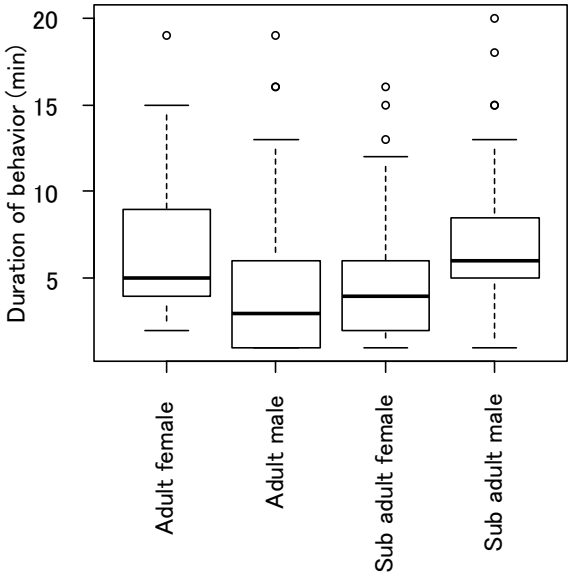


Fig. 5-8 Duration of behavior based on age-sex classes of elephants

Table 5-4 Pairwise comparisons of behavior for difference among different age-sex classes

	Wilcoxon rank sum test p-value							
	For no. of behavior				For duration			
Alert		Adult female	Adult male	Sub adult female		Adult female	Adult male	Sub adult female
	Adult male	0.56282	NA	NA	Adult male	1.91E-14	NA	NA
	Sub adult female	1	0.54015	NA	Sub adult female	0.00048	0.01357	NA
	Sub adult male	1	0.47223	1	Sub adult male	0.04765	1.28E-13	2.50E-05
Fear		Adult female	Adult male	Sub adult female		Adult female	Adult male	Sub adult female
	Adult male	0.00720	NA	NA	Adult male	1	NA	NA
	Sub adult female	0.70974	0.02440	NA	Sub adult female	1	1	NA
	Sub adult male	0.45870	0.00015	0.45870	Sub adult male	1	1	1
Stress		Adult female	Adult male	Sub adult female		Adult female	Adult male	Sub adult female
	Adult male	0.00586	NA	NA	Adult male	1	NA	NA
	Sub adult female	0.90564	0.04537	NA	Sub adult female	1	1	NA
	Sub adult male	0.46352	0.39913	0.54143	Sub adult male	1	1	1
Aggression		Adult female	Adult male	Sub adult female		Adult female	Adult male	Sub adult female
	Adult male	0.131530601	NA	NA	Adult male	1	NA	NA
	Sub adult female	1	0.11214	NA	Sub adult female	1	1	NA
	Sub adult male	1	0.47871	1	Sub adult male	1	1	1
Overall		Adult female	Adult male	Sub adult female		Adult female	Adult male	Sub adult female
	Adult male	0.38070	NA	NA	Adult male	0.02919	NA	NA
	Sub adult female	0.67191	0.17728	NA	Sub adult female	0.00137	0.17728	NA
	Sub adult male	0.68625	0.68625	0.27446	Sub adult male	0.00262	0.62530	0.02412

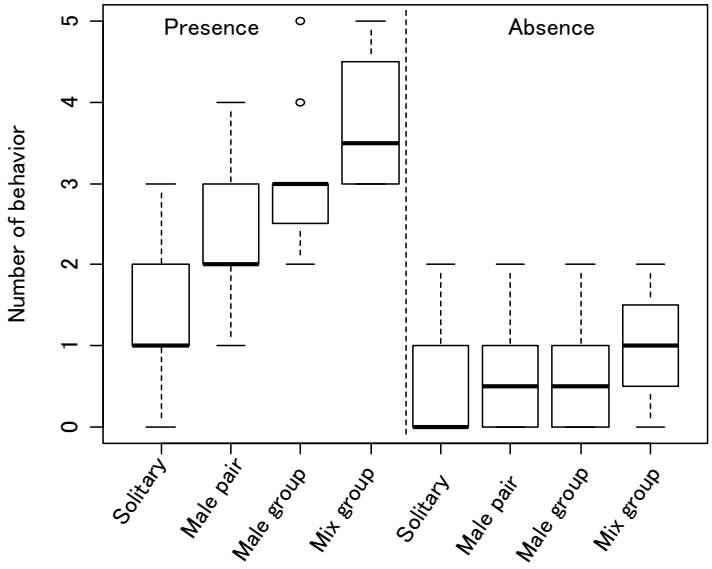


Fig. 5-9 Adult male behavior based on different male group types

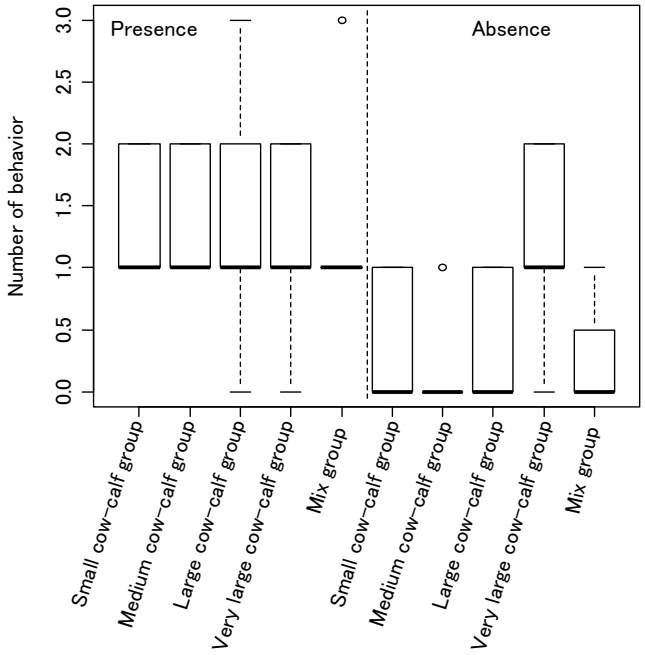


Fig. 5-10 Adult female behavior based on different female group types

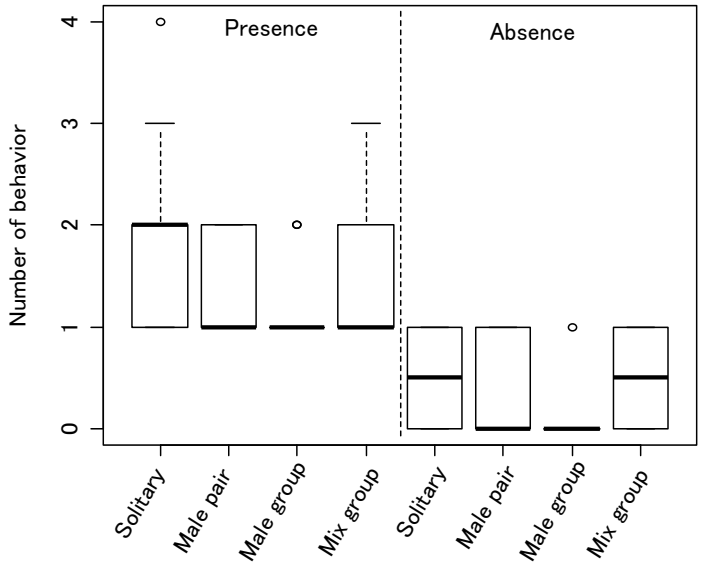


Fig. 5-11 Sub adult male behavior based on different male group types

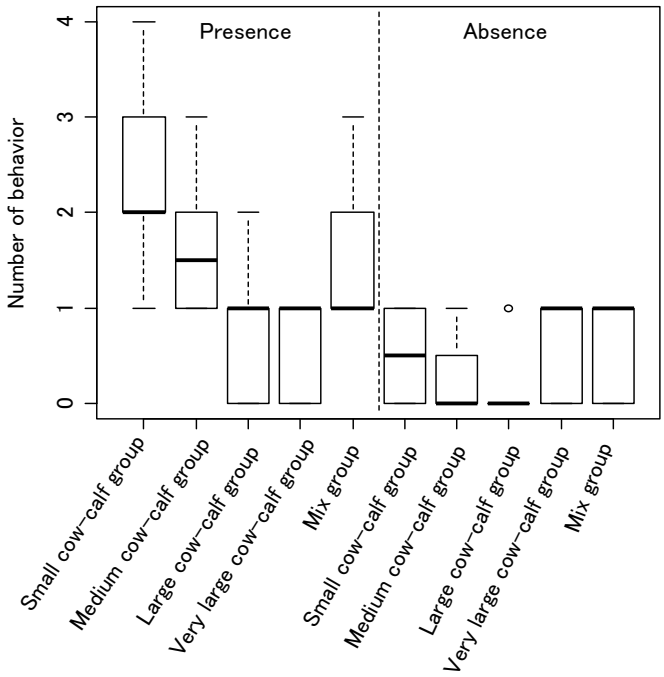


Fig. 5-12 Sub adult female behavior based on different female group types

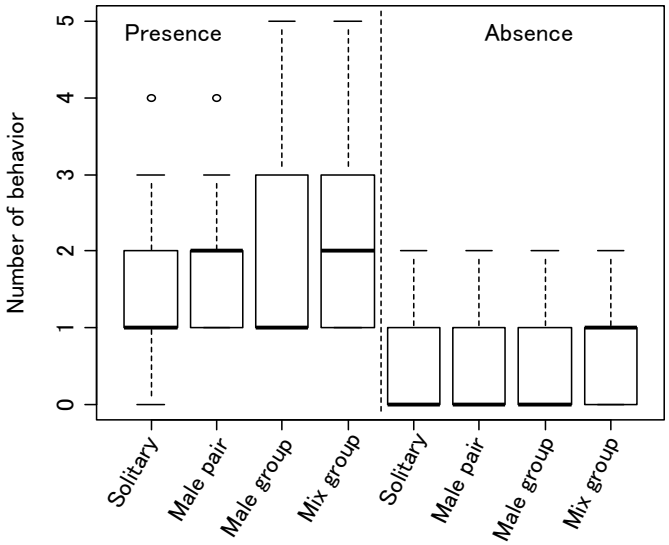


Fig. 5-13 Male elephant (adult male+ sub adult male) behavior based on different male group types

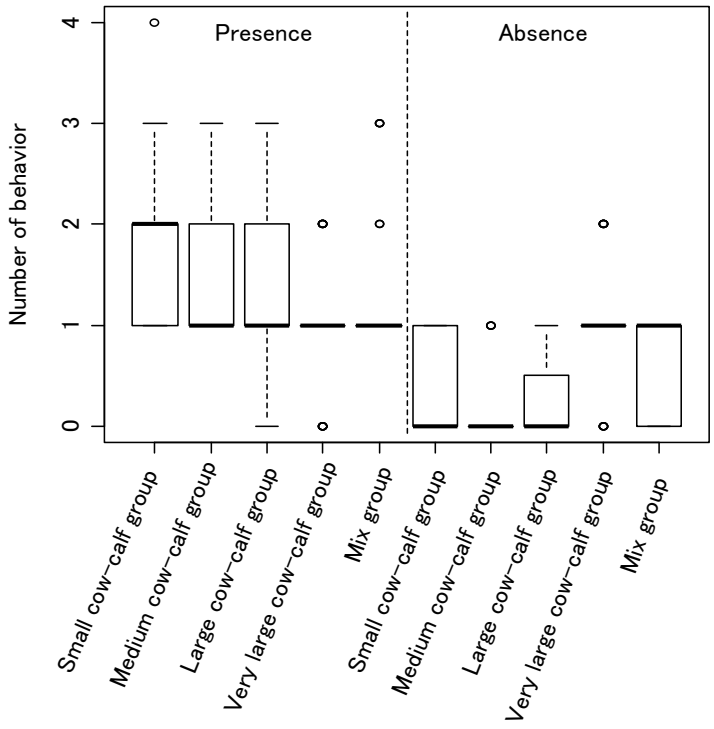


Fig. 5-14 Female elephant (adult female+ sub adult female) behavior based on different female group types

Table 5-5 Fisher's Exact Test pairwise comparisons of behavior among different group types of elephants

ALERT		Small cow-calf	Large cow-calf	Male group	Male pair	Medium cow-calf	Mix group	Solitary	Very large cow-calf
	Small cow-calf	NA	0.4568	0.1724	0.3958	0.6522	0.5847	0.7281	0.6102
	Large cow-calf	NA	NA	0.1284	0.1014	0.4938	0.5252	0.6157	0.9595
	Male group	NA	NA	NA	0.7176	0.8661	0.5332	0.5192	0.3123
	Male pair	NA	NA	NA	NA	0.8471	0.4638	0.5057	0.2504
	Medium cow-calf	NA	NA	NA	NA	NA	0.9795	0.9535	0.6687
	Mix group	NA	NA	NA	NA	NA	NA	0.968	0.6677
	Solitary	NA	NA	NA	NA	NA	NA	NA	0.8401
	Very Large cow-calf	NA	NA	NA	NA	NA	NA	NA	NA
FEAR		Small cow-calf	Large cow-calf	Male group	Male pair	Medium cow-calf	Mix group	Solitary	Very large cow-calf
	Small cow-calf	NA	0.4968	0.2304	0.2929	0.037	0.1234	0.2279	0.1589
	Large cow-calf	NA	NA	0.5092	0.8366	0.5737	0.7126	0.915	0.6182
	Male group	NA	NA	NA	0.7846	0.068	0.7131	0.5072	0.6922
	Male pair	NA	NA	NA	NA	0.2314	0.949	0.953	0.8261
	Medium cow-calf	NA	NA	NA	NA	NA	0.1899	0.3853	0.5047
	Mix group	NA	NA	NA	NA	NA	NA	0.8611	0.9175
	Solitary	NA	NA	NA	NA	NA	NA	NA	0.8651
	Very Large cow-calf	NA	NA	NA	NA	NA	NA	NA	NA
STRESS		Small cow-calf	Large cow-calf	Male group	Male pair	Medium cow-calf	Mix group	Solitary	Very large cow-calf
	Small cow-calf	NA	0.015	0.3523	0.096	0.7786	0.2664	0.2929	0.5787
	Large cow-calf	NA	NA	0.0025	0.0005	0.038	0.0005	0.1134	0.0565
	Male group	NA	NA	NA	0.4503	0.9815	0.022	0.1049	0.5012
	Male pair	NA	NA	NA	NA	0.4308	0.001	0.0045	0.038
	Medium cow-calf	NA	NA	NA	NA	NA	0.063	0.4893	0.6662
	Mix group	NA	NA	NA	NA	NA	NA	0.0005	0.4403
	Solitary	NA	NA	NA	NA	NA	NA	NA	0.1349
	Very Large cow-calf	NA	NA	NA	NA	NA	NA	NA	NA
AGGRESSION		Small cow-calf	Large cow-calf	Male group	Male pair	Medium cow-calf	Mix group	Solitary	Very large cow-calf
	Small cow-calf	NA	1	0.8331	0.3116	1	1	0.69	0.8096
	Large cow-calf	NA	NA	0.8096	0.3611	1	1	0.8191	0.7893
	Male group	NA	NA	NA	0.0959	0.8168	0.7195	0.4532	1
	Male pair	NA	NA	NA	NA	0.3687	0.1713	0.4717	0.1831
	Medium cow-calf	NA	NA	NA	NA	NA	1	0.822	1
	Mix group	NA	NA	NA	NA	NA	NA	0.6079	0.8276
	Solitary	NA	NA	NA	NA	NA	NA	NA	0.5079
	Very Large cow-calf	NA	NA	NA	NA	NA	NA	NA	NA
OVERALL		Small cow-calf	Large cow-calf	Male group	Male pair	Medium cow-calf	Mix group	Solitary	Very large cow-calf
	Small cow-calf	NA	0.5812	0.5452	0.0915	0.7881	0.7031	0.0515	0.8686
	Large cow-calf	NA	NA	0.938	0.006	0.6552	0.9205	0.1339	0.4728
	Male group	NA	NA	NA	0.003	0.5382	0.7681	0.019	0.5437
	Male pair	NA	NA	NA	NA	0.0125	0.004	0.0005	0.059
	Medium cow-calf	NA	NA	NA	NA	NA	0.8456	0.012	1
	Mix group	NA	NA	NA	NA	NA	NA	0.0175	0.6597
	Solitary	NA	NA	NA	NA	NA	NA	NA	0.0075
	Very Large cow-calf	NA	NA	NA	NA	NA	NA	NA	NA

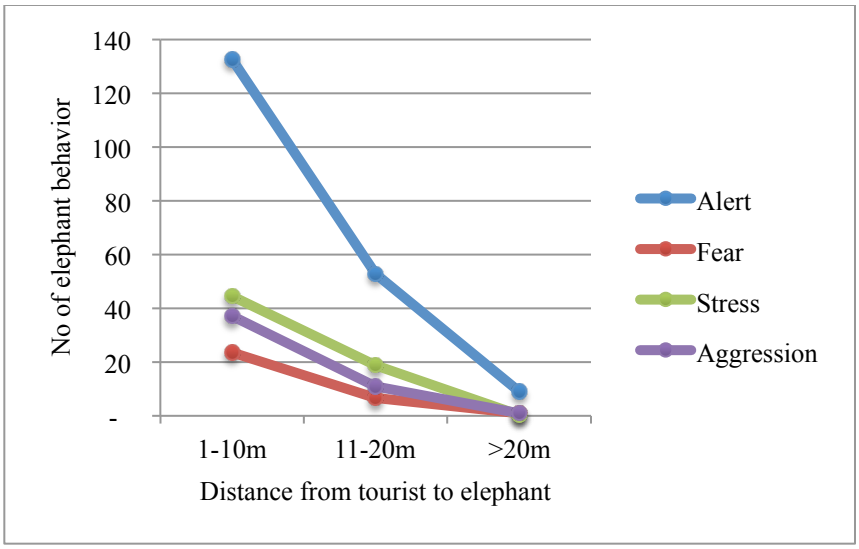


Fig. 5-15 Comparison of elephant behavior with distance

Table 5-6 Fisher's Exact test pairwise comparisons of behavior with distance based on age categories

	Adult female	Adult male	Sub adult female
Adult male	0.52854	NA	NA
Sub adult female	0.28777	0.00085	NA
Sub adult male	0.61948	0.9099	0.00177

Table 5-7 Fisher's Exact test for comparison of behavior and distance based on group type

	Small cow-calf	Large cow-calf	Male group	Male pairs	Medium cow-calf	Mix group	Solitary
Large cow-calf	0.57566	NA	NA	NA	NA	NA	NA
Male group	1	0.08246	NA	NA	NA	NA	NA
Male pairs	1	0.00011	1	NA	NA	NA	NA
Medium cow-calf	1	1	1	1	NA	NA	NA
Mix group	1	0.00145	0.56822	0.04854	1	NA	NA
Solitary	1	1	1	0.11151	1	0.00444	NA
Very Large cow-calf	1	1	1	1	1	1	1

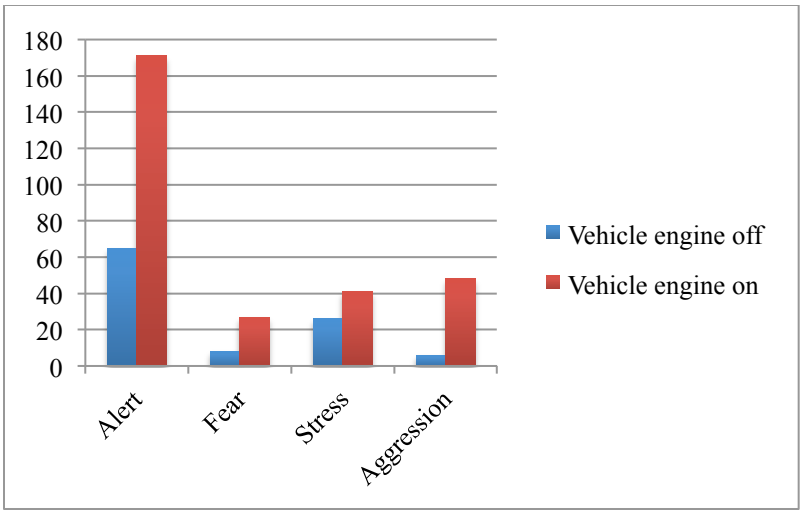


Fig. 5-16 Comparison of elephant behavior with the vehicle sound

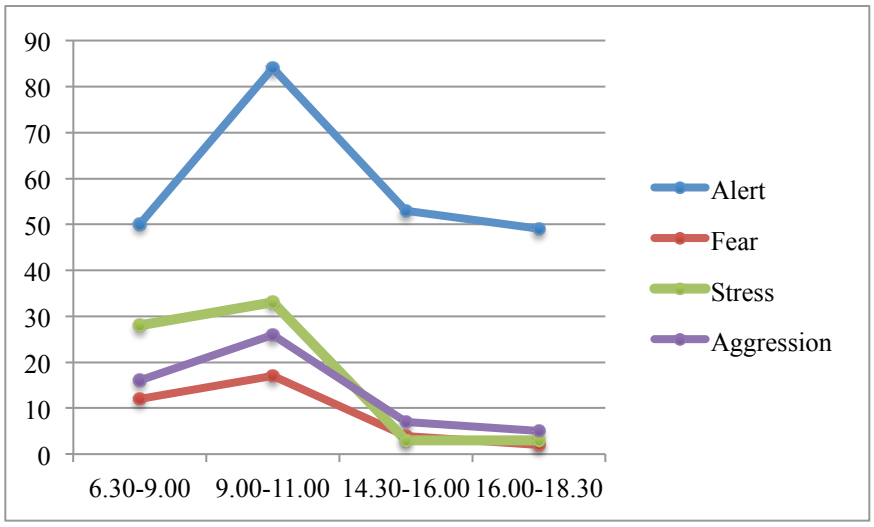


Fig. 5-17 Comparison of elephant behavior with the time of the day

Table 5-8 Fisher's Exact test comparison of behavior with the time of the day based on group type

	Small cow-calf	Large cow-calf	Male group	Male pairs	Medium cow-calf	Mix group	Solitary
Large cow-calf	1	NA	NA	NA	NA	NA	NA
Male group	1	1	NA	NA	NA	NA	NA
Male pairs	1	0.15440	0.13310	NA	NA	NA	NA
Medium cow-calf	1	1	1	0.31844	NA	NA	NA
Mix group	1	1	1	0.03957	1	NA	NA
Solitary	1	1	0.51488	0.00799	0.35489	0.49791	NA
Very Large cow-calf	1	1	1	1	1	1	0.21141

Table 5-9 Results of the Binary Logistic Regression analysis

Factor Information

Factor	Levels	Values
Tourist-Beh	3	1, 2, 3
Distance	3	1, 2, 3
Veh-On	2	1, 2
Time	2	1, 2

Logistic Regression Table

Predictor	Coef	SE Coef	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Constant	-1.85194	0.780951	-2.37	0.018			
Tourist-Beh							
2	2.29170	0.470502	4.87	0.000	9.89	3.93	24.88
3	4.51139	1.30407	3.46	0.001	91.05	7.07	1173.06
Distance							
2	-2.66150	0.604238	-4.40	0.004	0.07	0.02	0.23
3	-3.26643	0.798497	-4.09	0.000	0.04	0.01	0.18
Veh-On							
2	4.88715	0.593008	8.24	0.016	132.57	41.47	423.88
Time							
2	-1.30181	0.460873	-2.82	0.005	0.27	0.11	0.67
Veh-No	0.209864	0.308722	0.68	0.497	1.23	0.67	2.26

Tourist behavior (Tourist-Beh above)1=calm 2=loud 3=extreme

Distance 1=(1-10m) 2= (11-20m) 3= (>21m)

Vehicle sound 1=vehicle engine off 2=vehicle engine on (Veh-on above)

Time 1=6.30 a.m. to 11.00 a.m. 2= 2.30 p.m. to 6.30 p.m.

Box 5-1 List of Dos and Don'ts for watching elephants in the wild in Sri Lanka

Dos

1. Learn and obey the rules and regulations of the national park

2. Make sure your safari vehicle is in good running condition

3. Always follow the instructions given by the accompanying wildlife guard / safari guide

4. Stay inside the vehicle throughout the safari

5. Leave enough space (20-25 meters minimum) between the vehicle and elephants before stopping

6. Learn something from the safari trip about elephant ecology and conservation

7. Appreciate the jeep driver and the accompanying staff if they completed the elephant watching safari responsibly

Don'ts

1. Don't use alcohol and drugs in the national park and make sure your jeep driver and the accompanying staff are not on alcohol or drugs

2. Don't overload the jeep – 10 tourists is manageable

3. Don't encourage speeding – 25km/ hr is the recommended speed inside the national parks

4. No off-road driving!

5. Don't drive into elephant herds and don't block their movements

6. Never raise the engine when the elephants are around

7. Don't shout or scream while watching elephants – silence is rewarding!

8. No tipping for close-up shots of elephants

9. Never encourage the jeep driver and the accompanying staff to rush between locations inside the park for elephant viewing opportunities

(Source: Born Free Foundation per comm.)

Plate 5-15a Difficulty in observing elephants in the shrub habitat areas

(March, 2013)

Plate 5-15b Difficulty in observing elephants in the shrub habitat areas

(July, 2013)

IV. CONCLUSION

Tourism development in natural areas continues, and protected areas are among the prime attractions for tourists. Tourism planning in these natural areas includes various methods to reduce negative impacts mainly based on habitat conditions of the area such as impacts on vegetation or soil. Non consumptive uses of wildlife for tourism such as wildlife watching is a main focus in many protected areas because it is believed to be relatively harmless on wildlife compared to consumptive uses of wildlife such as hunting. However, the rapid expansion and increase in number of participants of this tourism sector has resulted in various concerns about the well being of wildlife. Wildlife is an important element of natural environment as well as an important resource for tourism. This study proposes a new approach in which behavioral responses of wildlife to tourists or tourism activities provide useful implications for tourism planning in wildlife areas. Wildlife behavioral studies have been conducted in the filed of conservation biology for the purposes of wildlife management in protected areas, however these studies hardly reveal tourism aspects that lead to impacts on wildlife behavior.

There is a common assumption that people who participate in wildlife watching are highly knowledgeable about wildlife and environmental sensitive people who are regularly involved in such activities and therefore impact on wildlife are low. However, as shown in the results of the chapter four, tourists who participate in wildlife watching activities in natural areas are not necessarily specialized people in wildlife viewing, but more general tourists who travel to natural areas as a family trip or outing with friends. There is a high potential that they do not understand the problems that can have on wildlife from their behavior or tourism activities that they participate in. Therefore, proper guiding and interpretation is important in order to minimize the impacts such as disturbance on wildlife that can occur as a result of tourist behavior during wildlife viewing. Tourists should be informed about the conservation status and problems associated with conservation of target wildlife species. Further, tourists should be encouraged to help or participate in the conservation efforts. In general, the tour guides or the drivers

make the decision on where to go and stop. Further these decisions are influenced by the demands of tourists. This suggests, given that the majority of visitors are in vehicles with guides or park drivers, the park management must work with them, as well as the tourists, to address the problem. Careful management is necessary to control this situation and to enable the wildlife to continue to live their normal lives. "Public education and general awareness about biodiversity conservation is a valuable tool to reduce tourism impacts" (Sinha 2001). However, there are various issues in establishing proper interpretation systems in protected areas, especially in developing countries. The case of this study was lack of training and funds. Guides were employed on a voluntary basis and paid a small daily allowance and most of their income was based on the tips from tourists. Therefore, guides were very keen to please visitors and make sure they gain a good view of wildlife. This fact was reflected on the results of the close distance that tourists watched elephants. The economic benefits from tourism are not always shared equitably and this has been a common issue in both developed and developing countries, especially, a large proportion of the income from wildlife tourism in many developing countries leaks out of the country and the little money left behind is channeled directly to the national treasury with little or no benefit accruing to the local community or site conservation (Sinha 2001). Allocation of funds in the area considering the role of interpretation in minimizing the impacts on one of the most endangered species in the world is vital in aiming at an environmental sustainable tourism.

Elephants are the largest terrestrial animal in the world and exist only in few countries in Asia and Africa at present, mainly in developing countries. Many people today, travel to elephant habitats to view this large creature in its natural environment, thus elephants have become flagships for tourism promotions in many countries. On the other hand, elephants are threatened species globally competing with people for resources and land. Protected areas are built to conserve elephants in the countries where elephants exist, however, most being developing countries, tourism is required as a means of funds for long term conservation of elephants. Tourism disturbance on elephants in protected areas is a least studied aspect of human impact on elephants. As indicated from the results of this study, tourism disturbance should not to be underestimated in terms of its effects on the well being of elephants. Elephants are social

animals and habituate to humans over time. Habituation is often misunderstood as a positive outcome. Even at Udawalawe National Park, it is often assumed that elephants are well habituated to tourists and do not get effected by the presence of tourists. There has not been any comprehensive study on tourism disturbance on elephants based on elephant behavioral responses to tourism activities. Therefore, this study in a famous elephant watching destination in the world, provides important insights to such problems. As indicated by the result of chapter five, tourists and tourism activities caused disturbance and reduced feeding time of wild elephants at Udwalawe National Park in Sri Lanka. The main causes of disturbance were tourist behavior, close distance, the noise from the vehicle activity and the time of the day that the tours took place. Improving the interpretation system of the park can minimize impact of tourism related causes of disturbance. Conditions of the vehicles used in the park should also be considered as the vehicle noise was highly disruptive on elephants. Vehicle engines should kept off when viewing elephants as much as possible. Morning hours tend to be more vulnerable to elephants than the evening hours. Tours should be carefully operated during these sensitive times. The effects of non-consumptive tourism (e.g. wildlife viewing, photographing, feeding), even though no animal is directly hunted and removed from their natural habitats, could be as detrimental as those of consumptive tourism (e.g. hunting) if managed poorly. Sustaining the benefits of wildlife watching tourism for recreation, education, and conservation requires strategic and long-term management planning to ensure that the adverse impacts of wildlife-tourist interactions are minimized. Some initiatives have been taken in some parks in Sri Lanka such as discussions about tourism impact with related stakeholders such as park management, guides, tour operators and drivers. It is also important to encourage scientific research on the impacts of tourism on wildlife to further support decisions in tourism planning in wildlife areas.

Countries with high level of biodiversity diversity, such as Sri Lanka, are popular wildlife tourist destinations. While the tourism provides revenue and contributes significantly to the country's economy, increasing pressure of tourism on the natural environment and wildlife can also become critical. Since the range of opportunities for wildlife-tourist interactions is broadening, its implications on biodiversity conservation and tourism management should be addressed so as to provide visitor's satisfaction without

compromising the welfare and safety of wild species. This involves developing regulatory measures and management procedures based on scientific knowledge about the ecological requirements of wild species at tourist destination. For instance, avoiding very close distance watching of wildlife does not only protect the animals but also ensure the safety of tourists.

Amongst the more popular discussions of nature based tourism there is often a simple assumption that it is inevitably environment friendly. It may appear ideal compared with many forms of mass tourism, yet it can cause significant problems. While many conservationists are against the direct, consumptive use of native wildlife, they generally accept the non-consumptive use of wildlife where tourists appreciate and learn about wildlife in their natural habitats. The term, non-consumptive wildlife use might imply no threat to the wildlife. Unfortunately, unintended negative effects of wildlife watchers occur. Very little is yet known about the tolerance levels of wildlife for human contact in the wild. Thus, knowledge of visitor impacts is critical for sustainable tourism management in national parks. Research integrating human dimensions and wildlife dimensions has been rarely conducted. Appropriate policies and management practice in tourism, recreation and wildlife management should be implemented and monitored. There should be more and integrated research on the short and long-term impacts of wildlife tourism on species, habitats and ecosystems and study of visitors' perceptions and expectations at tourist destination area. This research attempted to fill this gap through the integrative approach that attempts to understand one important aspect of tourism impacts in a national park. "Protected areas needs tourism and tourism needs protected areas" (Eagles et al. 2002). Reducing negative impacts through the implementation of appropriate policies, planning and management strategies is essential to the development of a sustainable tourism industry.

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APPENDIX

Questionnaire used for visitor survey at Udawalawe National Park (original English version)

Udawalawe National Park Visitor Survey

We value your feedback

Dear Visitor,

Welcome to Udawalawe National Park, an area managed by the Department of Wildlife Conservation, Sri Lanka.

This survey aims to obtain your views about your visit today. We hope you can spare the time to fill out this questionnaire as your feedback will help manage this area better.

This survey will only take a few minutes to complete. Once completed, please return it to field work researcher.

Thank you for sharing your thoughts and ideas.

Faculty of Tourism Science, Tokyo Metropolitan University, Japan

Faculty of Zoology, University of Colombo, Sri Lanka

Fieldwork assistance: University of Moratuwa, Sri Lanka

Research permission obtained by the Department of Wildlife Conservation, Sri Lanka.

You and your visit to Udawalawe National Park

Please tick relevant box (es) and answer for yourself only

Q.1 To what extent does the opportunity to view wildlife influence your decision when making for your holidays? *Please tick one box only*

□ Never □ Rarely □Sometimes □ Often □Always

Q.2 How often do you take wildlife excursions ? *Please tick one box only*

□ First visit □ Every few years □ Once a year □ 2–5 times a year □ More than 5 times a year

□ On a weekly basis □ Other _____

Q.3 Are you affiliated with any environmental group or involved in conservational or wildlife related activity? *Please tick one box only*

□ Yes □ No

Q.4 Including you, how many people altogether are in your travel group?

Adults_____ Children (under 18 years old) _____

Q.4 When you were planning your trip, was the visit to this park….. ? *Please tick one box only*

□ The main destination for this trip □ One of several destinations on this trip

□ Not a planned destination on this trip

Q.5 What are the equipments you brought with you for this visit? *You may tick more than one box*

□ Photographic equipments □ Binoculars/ Scoopers □Field guides/ maps □ Other____

Q.6 Purpose of your visit to this park? *Please circle one number for each factor to rate how important each of the below factors for you as a visitor to this Park*

Motivational factors	Important level rating				
	Not at all important	Slightly important	Moderately important	Very important	Extremely important
To experience excitement	1	2	3	4	5
To do something with your Family	1	2	3	4	5
To be with friends/ colleagues	1	2	3	4	5
To explore new things	1	2	3	4	5
To study wildlife/ nature	1	2	3	4	5
To be close to nature	1	2	3	4	5
To do something creative such as sketch, paint, photography	1	2	3	4	5
To have a change from your daily routine	1	2	3	4	5
To experience tranquility	1	2	3	4	5
To teach others about things here	1	2	3	4	5
To lead the group	1	2	3	4	5

Q.7 How strongly do you agree or disagree with following statements? *Circle one number for each statement where 1st is weakest and 7th is strongest*	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
Humans should manage wildlife populations so that humans benefit	1	2	3	4	5	6	7
The needs of humans should take priority over wildlife protection	1	2	3	4	5	6	7
Hunting enables people to enjoy the outdoors in a positive manner	1	2	3	4	5	6	7
Hunting is cruel and inhumane to animals	1	2	3	4	5	6	7
Having wildlife around my home is important to me	1	2	3	4	5	6	7
I enjoy learning about wildlife	1	2	3	4	5	6	7
I enjoy watching wildlife when I take a trip outdoors	1	2	3	4	5	6	7
It is always important to have abundant wildlife	1	2	3	4	5	6	7

Thank you very much for taking the time to complete this survey. Have a safe journey.

Office Use Only

Date of visit _____/_____/_____

No

Notes

Results of Binary Logistic Regression analysis

Binary Logistic Regression

Link Function: Logit

Response Information

Variable	Value	Count	
Ele-Beh	1	338	(Event)
	0	319	
	Total	657	

Factor Information

Factor	Levels	Values
Tourist beh	3	1, 2, 3
Distnace	3	1, 2, 3
Veh-On	2	1, 2
Time	2	1, 2

Logistic Regression Table

Predictor	Coef	SE Coef	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Constant	-1.85194	0.780951	-2.37	0.018			
Tourist-beh							
2	2.29170	0.470502	4.87	0.000	9.89	3.93	24.88
3	4.51139	1.30407	3.46	0.001	91.05	7.07	1173.06
Distance							
2	-2.66150	0.604238	-4.40	0.004	0.07	0.02	0.23
3	-3.26643	0.798497	-4.09	0.000	0.04	0.01	0.18
Veh-On							
2	4.88715	0.593008	8.24	0.016	132.57	41.47	423.88
Time							
2	-1.30181	0.460873	-2.82	0.005	0.27	0.11	0.67
Veh-No	0.209864	0.308722	0.68	0.497	1.23	0.67	2.26

Tests for terms with more than 1 degree of freedom

Term	Chi-Square	DF	P
Tourist-beh	30.0506	2	0.000
Distance	23.1878	2	0.000

Log-Likelihood = -71.887
Test that all slopes are zero: G = 766.472, DF = 7, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	42.3710	64	0.983
Deviance	39.7920	64	0.992
Hosmer-Lemeshow	5.9774	6	0.426
Brown:			
General Alternative	3.2745	2	0.195
Symmetric Alternative	0.0021	1	0.964

Table of Observed and Expected Frequencies:
(See Hosmer-Lemeshow Test for the Pearson Chi-Square Statistic)

	Group								
Value	1	2	3	4	5	6	7	8	Total
1									
Obs	0	0	7	74	73	84	71	29	338
Exp	0.3	0.3	6.5	71.6	74.9	83.6	71.8	29.0	
0									
Obs	144	94	60	16	4	0	1	0	319
Exp	143.7	93.7	60.5	18.4	2.1	0.4	0.2	0.0	
Total	144	94	67	90	77	84	72	29	657

Measures of Association:
(Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures	
Concordant	106571	98.8	Somers' D	0.98
Discordant	927	0.9	Goodman-Kruskal Gamma	0.98
Ties	324	0.3	Kendall's Tau-a	0.49
Total	107822	100.0		