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The Study of Impacts of Ecotourism and Anthropogenic Pressures on the Mammalian Fauna of Ecopark at Hamirgarh, Bhilwara, Rajasthan



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Abstract

Study of impacts of ecotourism and anthropogenic pressures on mammalian fauna of ecopark at Hamirgarh, district Bhilwara in the state of Rajasthan, India, was carried out from January 2017 to January 2018 along with the department of forest of Bhilwara. The whole ecopark was divided into two zones for this study, zone A and zone B where the tourists would be frequenting. Zone A and zone B were further divided into five sub zones. The study was carried out on Sundays and Wednesdays of first week of every month. Sundays being a holiday when there would be many visitors to the ecopark and Wednesday, when the ecopark would be closed for visitors.

The observations were taken from the watch- towers near the artificial water- holes in all the five sub- zones, set up by forest department for assessing mammalian population in the ecopark. The data regarding tourists were collected from the forest department office and correlated with mammalian observations and were analysed.

Trends showed, the impacts of ecotourism, is species specific, with some species increasing in number and some others decreasing in density, while some others remained unaffected. When tourists were more, some mammals changed behavior some got habituated to human presence. This in effect may lead to ecological changes in a long run. If the animals are exposed to a longer period of human disturbances, it may even change the floristic make –up of the entire area. So it was concluded that seeing the possible negative impacts of ecotourism and anthropogenic pressures on mammalian fauna of such ecoparks, the government should formulate such policies and strategies so as to minimize the negative impacts on the wild life and their conservation.

Keywords: Ecotourism, Ecopark, Hamirgarh, Conservation, Mammalian Fauna, Human - Disturbances.

Introduction

Ecotourism, as defined by The International Eco-tourism Society (TIES) is the responsible travel to natural areas that conserves the wildlife, environment and the well- being of the local people. It is a form of tourism involving fragile, pristine, and relatively undisturbed natural areas. This tourism has grown dramatically in recent years. The contribution of ecotourism to country's economy has increased significantly. It has been established as a solution for conserving wild flora and fauna and development while providing economic growth for people living in and around protected areas as studied by Wells and Brandon (1992). It creates serious socio-economic effects as suggested by Rajat and Aruna, (2014) and Bassam & Mujeeb Rehman, (2016). Similarly ecotourism deeply penetrates on the regional economy as explained by Madhusudan Karmakar (2011). Though ecotourism is increasing in popularity, little information exists on protected areas as informed by Boo (1990).

In India, ecotourism has developed quite recently, as India offers enormous diversity in topography, natural resources and climate. The most significant feature of ecotourism industry in India is its capacity to generate large scale- employment, especially in remote and under- developed areas. It focuses on local cultures, adventures and environmental protection. As has been studied by Aberham et al. (2017) about the attitudes and

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practices of local people towards wildlife in Ethiopia. Human wildlife conflict asserts a major role in the ecotourism of any place as confirmed by Bezihalem et al.(2017). Human traffic has quite adverse impacts on the wildlife as mentioned and described by Dadem et al. (2018) in their study of anthropogenic pressure on wildlife in National park in Cameroon, and by Griffiths and Shaik (1993) on the abundance and activity periods of Sumatran Rain Forest. Wells & Katrina (1992) made links between the protected area management, conservation with local communities. Ecotourism can have a vital role in conservation of wildlife as well, as has been mentioned by Ben-Yehuda (2018) and Dhokia et al. (2009). Kruger (2005) also studied and stressed the role of ecotourism in conservation. Misra et al. (2006) assessed the threats and conservation needs and found co-relation in their study of mammals of high altitudes of Arunachal Pradesh. Vladimir and Hall (2018) and also Clarke (2016) made special notes on mammal watching in protected areas and confirmed it to be a new support for science and conservation strategies. Okech (2003) bonded economy with ecotourism and showed the high amount of benefits in the case study of ecotourism in Kenya.

But ecotourism can have adverse effects too on wildlife, by causing changes in their behavior, physiology or damaging their habitats. The presence of tourists may frighten animals and have negative effects on breeding and other aspects of their life.(Knight and Cole 1995). The presence of humans changes the way, animals behave and these changes may make them more vulnerable to poachers etc. The presence of humans (tourists) can also discourage natural predators, creating a kind of safe haven for smaller animals that may make them bolder.

Interacting or the presence of humans can cause significant changes in the characteristics of

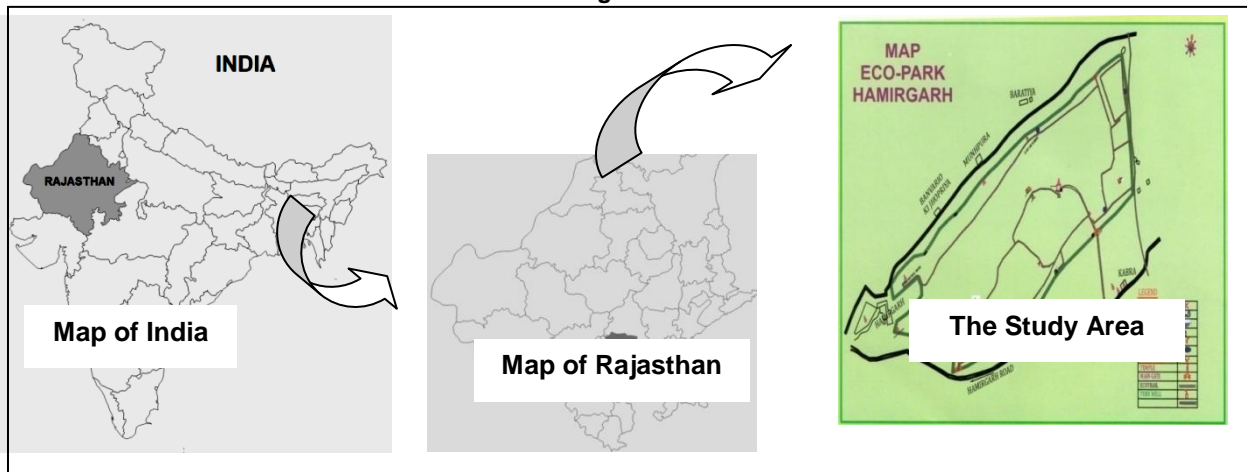
various species over time .Ecotourism has effects similar to those of animals domestication and urbanization .Regular interaction between people and animals may lead to habituation, a kind of taming . The study has shown the jackal or fox for that matter have become more docile and less fearful, a process that results from evolutionary changes, but also from regular interactions with humans. It can be hoped, this study would encourage more research on mammalian fauna and their interactions with tourists visiting this ecopark at Hamrigarh.

Study Area

The ecopark wildlife reserve (the study area) is in Hamirgarh, an old princely town in district of Bhilwara, Rajasthan, India. It stands at an altitude of 425 meters above the sea-level between 25° 11' 0" North & 74° 38' 0" East, and is spread in 567 hectares. It was declared an 'ecopark' by the government of Rajasthan in the year 2012 to conserve the mammalian fauna present in the reserve, specially chinkara or Indian gazelle (*Gazella bennetti*). It is located 20KM towards south of the district headquarter and lies on four-lane highway NH-79, which gives a good enough opportunity to general public to have a glimpse of wild life.

This ecopark is home to various kinds of mammalian fauna, namely, fox(*Vulpes bengalesis*), jackal (*Canis acereus*), nilgai or blue bull (*Boselaphus tragocamelus*), chinkara (*Gazella bennetti*), wild boar (*Sus scrofa*) porcupine (*Hystrix indica indica*) and hyena (*Hyaena hyaena*). The forest type is tropical dry deciduous and has many types of hybrid fodder species, like salar (*Bose wellia serrata*), kherni (*Wrightia tinctoria*), kher(*acacia catechu*), ber (*Ziziphus mauritiana*), palas (*Butea monosperma*), dhawda (*Anogeissus pendula*), gory dhawan (*Anogeissus latifolia*) and many types of wild grass. The location of the study area is shown in the figure-1.

Figure-1



Objective of the Study

The main objective of this study is to assess the impacts of Ecotourism and Anthropogenic pressures on the mammalian fauna of ecopark at Hamirgarh, Bhilwara, Rajasthan and to suggest ways and means to minimize such impacts.

Review of Literature

Ecotourism may have major effects on wildlife survival and reproduction for species and population in conservation reserves where wildlife survives only in protected areas, increased disturbances from ecotourists and other wildlife

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watchers, specially during critical periods such as, breeding, migration may have significant consequences for conservation of species concerned. Disturbance to wildlife from sight, sound or smell of humans has been recorded for a wide range of species. Physiological indicators of stress, such as temperature and heart beat rate, are also affected by such disturbances, as experimented by Gabrielsen and Smith (1995). MacArthur et al. (1982) used remote telemetry to detect increases in heart rate of mountain bighorn sheep approached by hikers. Increases of up to 20 beats/ min. were recorded. When the wildlife species are disturbed by ecotourist, the first signs are behavioural changes like alertness or change in vocalizations as studied by Pedevillano and Wright (1987) and Grieser- Johns (1996).

Perhaps the most commonly reported response to human disturbances, specially by larger mammals in open terrain, is simply, to move away as described by Buckley (2003). Tourist traffic may be a significant contributor to road-kill in many areas as declared by Gunther et al. (1998).

Disturbance from tourism can affect the energy balance of affected animals as described by Moen (1976). Tourist disturbances to breeding has been recorded for a range of species. Thomson's gazelle, for example leave breeding areas if disturbed, reducing their reproductive success. Kangaroos, if disturbed ejects their joeys from the pouch as mentioned by Stuart- Dick (1987). Similarly wolves & coyotes move their pups to different dens as conformed by Harrison and Gilbert (1985). There are hundreds and thousands of wildlife species worldwide, which are watched and approached by tourists, behave differently on different places, at different occasions and different conditions.

Concepts and Hypothesis

The study had following hypothesis: (a) Ecotourism and anthropogenic pressures has more of negative impacts on the behavioural patterns of mammalian fauna. (b) Ecotourism affects the population densities of mammals. (c) Ecotourism may alter the floristic makeup of an area due to altered patterns of seed dispersal.

Methodology

This study was carried out from January 2017 to January 2018, incorporating firstly, the flagship method ie water-hole method for counting and establishing mammalian diversity, alongwith direct observations. The counting process was done biannually, first in the month of May- 2017 and secondly in the month of November 2017. The ecopark was divided majorly in two zones A and B and further divided into five sub-zones, as per the local names, namely, Bheru ji ki khel, Hyde tanka, Bachora tanka, Hand-pump tanka and Ghas-beed tanka, these five sub- zones had in each, an artificial water- hole, where the animals would frequent for drinking water and thus, census being done.

Zone A has an ancient temple, where hoards of visitors from the nearby villages and city dwellers would come to pray and perform rituals and also for watching wildlife in the ecopark. Zone B has Swiss-

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tents, set up by the forest department for tourists. The observations were taken from watch-towers at each water-hole. The behavioural study of mammals was done on Sunday and Wednesday of first week of every month. Sunday, being a holiday, the ecopark would be flooded with visitors whereas on Wednesday, there would be no visitors or very few visitors as the ecopark use to be closed weekly on Wednesday. The data of the tourist were collected from the forest department office, as every visitor had to take a ticket to enter into the ecopark.

In order to get a fair knowledge of the study area, exploration surveys were carried out in the early months of the study period, throughout the ecopark. A few conventional methods of observations, like trail sampling, sign surveys, pug-marks, faeces, digging and territorial markings, showing the presence of animals were used.

Figure – 2



Felled-Tree



Water- Hole

Along with it, we interviewed the forest staff at the ecopark and the villagers living nearby regarding mammals. The villagers were also shown photographs of the animals, to create awareness about the mammalian diversity of the study area. (Misra et al. 2006) We also kept a regular note on the vehicular disturbances and noise created by the vehicles passing through the ecopark going to the temple. Thus, this way we carried out the study during the entire study period and data collected at all possible fronts.

Results and Findings

During the study, we recorded seven species of mammals. Out of which, chinkara or Indian gazelle (*Gazella bennetti*), which has already been included in the Red list of IUCN as LRNT (low risk near threatened) in 2000 as mentioned by Dhokia et al (2009) was found to be decreasing in number from 77 in May 2017 to 66 in November 2017 census. This may be due to the reason that chinkara being small and shy animal, could not adapt itself to the fieldcrop, as their favourite food is green lush grass. They are

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mainly grazers depending on the ground food, unlike other herbivores, nilgai and wild boar. Nilgai grew in number from 215 to 231 during this period. The carnivores, jackal and fox also grew in number from 154 to 159 and 14 to 19 respectively. Wild boar

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decreased in number from 38 to 35 owing to likely predation, possible poaching or vehicular accidents. Porcupine population was found to be stable in both the seasons, as shown in table-1.

Table - 1
Population - Count of Mammals in Year 2017 (Dry & Wet Season)

S N	Mammals Name of Zone	Jackal		Hyena		Fox		Nilgai		Chinkara		Wild Boar		Porsupine	
		May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.	May	Nov.
1	Bheru Ji ka Khel	33	15	0	1	2	1	60	62	8	7	0	5	0	0
2	Hyde Tanka	26	28	0	0	5	6	33	39	15	14	9	7	2	1
3	Bachora Tanka	30	34	2	0	0	1	15	28	10	15	7	8	0	1
4	Hand Pump Tanka	45	42	0	0	5	4	44	40	26	17	14	8	0	0
5	Ghas-beed Tanka	20	40	0	0	2	7	63	62	18	13	8	7	0	0
	Total	154	159	2	1	14	19	215	231	77	66	38	35	2	2

We also observed that the population of mammals at the ecopark varied on Sundays (with more visitors) and on Wednesday (without tourists) in any given month, at all the five different water-holes, in both the seasons (dry & wet), as shown in the table 2&3.

Table -2: Dry- Season (May-2017)

Day S.N.	Mammals Name of zone	Sunday (With Tourist)							Wednesday (Without Tourist)						
		Jackal	Hyena	Fox	Nilgai	Chin- kara	Wild boar	Por- cupine	Jackal	Hyena	Fox	Nilgai	chinka ra	Wild boar	Por cupine
1	Bheru ji ki khel	3	1	3	4	2	2	0	4	0	0	5	1	1	1
2	Hyde tanka,	2	0	3	4	4	1	0	2	0	2	2	5	1	0
3	Bachora tannka,	2	0	2	2	3	1	0	3	0	3	4	6	0	0
4	Hand-pump tanka	4	0	0	2	3	0	0	3	1	2	2	2	2	0
5	Ghas-beed tanka	0	0	0	3	2	0	0	3	0	4	4	4	2	0
	Total	11	1	8	15	14	4	0	15	1	11	17	18	6	1

Table-3: Wet Season (Nov-2017)

Day S.N.	Mammals Name of zone	Sunday (With Tourist)							Wednesday (Without Tourist)						
		Jackal	Hyena	Fox	Nilgai	Chin- kara	Wild Boar	Por- Cupine	Jackal	Hyena	Fox	Nilgai	Chin- kara	Wild Boar	Por- cupine
1	Bheru ji ki khel	5	0	4	2	0	3	0	6	0	3	5	4	2	0
2	Hyde tanka,	6	0	3	5	5	2	0	4	0	5	5	2	1	1
3	Bachora tanka,	2	0	3	6	4	2	0	3	0	2	7	6	3	0
4	Hand-pump tannka	3	0	1	3	8	0	1	2	1	3	8	6	1	0
5	Ghas-beed tanka	1	0	1	7	3	0	0	2	0	1	2	4	2	0
	Total	17	0	12	23	20	7	1	17	1	14	27	22	9	1

In the dry- season, we observed that the species got restricted around the water-holes than in the wet-season. On the other hand, we also noted that during wet-season, when the grasses and other fodder species becomes bountiful, mammal herd-sizes increased, while in the dry-season, when the resource availability and quality of forage declines, the

mammals were found to be dispersing into small family units, hereby decreasing herd sizes.

The other observations, worth nothing were that the density of chinkara (*Gazella bennetti*) was found to be high at those points where the tourist's presence was more. It may be because these animals found humans very acceptable. The jackals were

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found to be howling at different times of the night differently at all the five sub-zones. Few foxes were observed to be straying to the nearby villages occasionally. Nilgai were seen moving in groups and found grazing most of the time, specially in mornings and evenings. Their faeces were collected and studied for their eating habits. Wild – boars were seen sometimes in bunch of 3-4 whereas porcupine was traced with extreme difficulty with the help of forest observers.

Conclusion

Based on the theory that ecotourism is growing rapidly and the observations made by this study, it is important to determine the impacts of ecotourism on the mammalian fauna in a protected area such as this ecopark at Hamirgarh, Bhilwara, in the state of Rajasthan. Ecotourism has great potential for negative impacts on wildlife as tourists wish to see rare species, incidently or purposely, during sensitive times, such as breeding or nesting as mentioned by Knight and Cole (1995). It can be stressed that tourist cause negative impacts on movements, foraging and reproductive behavior of various mammals. Ecotourism impacts have resulted in abnormally high or low densities of some species in tourist areas, which can possibly lead to ecological change. Due to this reason there may be long term consequences on the floristic make-up of the area due to altered patterns of seed dispersal. These changes may have effects on the composition and functioning of the entire ecosystem. So, protected areas such as this ecopark, should develop management strategies to minimize the impacts of tourists on animals and wildlife in general and data of such studies can be used to formulate ecotourism development and conservation policies.

Suggestions

Seeing the tremendous future of ecotourism worldwide, Indian government should open more reserved and protected areas such as this ecopark at Hamirgarh. It should formulate such management strategies so as to minimise the negative impacts of ecotourism. As far as this ecopark is concerned, more funds should be allotted for development of infrastructure like making sustainable water – holes at more places, building proper watch-towers to observe mammals, develop more fencing to avoid poaching and felling of trees and start special drive of plantation of suitable fodder species to conserve the wildlife and their habitats.

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