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SHORT COMMUNICATION

OPEN GARBAGE DUMPS NEAR PROTECTED AREAS IN UTTARAKHAND: AN EMERGING THREAT TO ASIAN ELEPHANTS IN THE SHIVALIK ELEPHANT RESERVE

Kanchan Puri, Ritesh Joshi & Vaibhav Singh

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Open garbage dumps near protected areas in Uttarakhand: an emerging threat to Asian Elephants in the Shivalik Elephant Reserve

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Abstract: Waste dumping sites near protected areas are a growing issue, which may affect the activities and behaviour of wildlife, more than what we notice. Here, we present two of our case studies, where Asian Elephants were found feeding at garbage dumps in Haridwar and Ramnagar forest divisions in the Shivalik Elephant Reserve in Uttarakhand State. Since garbage dumps may spread bacterial infection and induce adverse changes in the health conditions of the elephant population, we draw the attention of planners to develop a plan of action for proper disposal of the garbage through these preliminary observations, without affecting protected areas and wildlife species, including elephants. Moreover, collection of data on the presence of garbage dumps across the reserve and a study on the behavioural responses of scavenging and non-scavenging animals visiting the dumps would give us a better understanding of the level of impact of garbage dumps for disposal planning. It is to emphasize that garbage does not constitute a part of natural food for elephants. There are restrictions and guidelines in the Indian Wildlife (Protection) Act 1972, Solid Waste Management Rules, 2016 and Guidelines for Declaration of Eco-Sensitive Zones around National Parks and Wildlife Sanctuaries.

Keywords: Elephants, garbage dumps, protected areas, Shivalik Elephant Reserve.

Protected areas play a key role in maintaining biodiversity and services provided by natural systems (Kolahi et al. 2013). Dumped garbage that is nondegradable or contain harmful chemicals, may cause negative impact on the regeneration of vegetation, ground water reservoirs, and adversely affect the life and behaviour of wildlife anywhere, including protected

areas.

Protected areas defined under the Wildlife (Protection) Act, 1972 and its amendments, are carefully delineated habitats for wildlife conservation. Of late, waste dumping sites near protected areas have become a serious issue, which may be affecting the activities and behaviour of wildlife, more than what we readily notice. The food waste generated by humans is often accessible to wildlife, which not only affects wildlife ecology and behaviour but also affects the ecological processes and community dynamics (Newsome & van Eeden 2017). One of the most significant threats in the protected areas in Asia is inappropriate waste management, which is related with the practice of land filling or combustion of waste and low environmental awareness (Przydatek 2019). The congregation of animals at rubbish dumps near human settlements may increase negative human-animal interactions like animal attacks on people, livestock depredation, and the risk of aircraft collision with scavenging birds (Plaza & Lambertucci 2017).

In the last few years, there have been reports of wild animals straying to the outskirts of protected habitats, near the garbage dumps. Such garbage around the protected forests is usually dumped unknowingly by tourists or thrown on the road side by the people living adjacent to the forests. Garbage dumps normally

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comprise of both the residual organic and inorganic waste from the cities. Contrary to all this, it is also true that these temporary garbage dumps attract wild animals and among several adverse possibilities, it may pose threat for premature death as well. It is now widely acknowledged that the attraction of wildlife to the dumping sites is also changing the behavior of individuals, particularly in making them opportunistic feeders. Wild animals feeding on the garbage in the outskirts of forests may have drastic impacts on their behaviour; it may affect their activity pattern and even made them the carriers of pathogenic infections.

A recent study carried out on the foraging behavior of some vertebrates near garbage dumps and the risk of plastic consumption indicated that the garbage dumps are resulting in a shift in food habits of some wild animals (Katlam et al. 2018).

In this note, we report on two case studies in which elephants were feeding on the garbage dumps lying across Haridwar and Ramnagar forest divisions in the state of Uttarakhand, India (Image 1). These divisions are among the crucial habitats for elephants, as these habitats are endowed with the natural water reservoirs

and food plant species of elephants. Both the study areas fall under the Shivalik Elephant Reserve in northern India and are adjacent to Rajaji and Corbett national parks.

STUDY SITES AND OBSERVATION OF CASES

In the year 2002, one of the northwestern elephant range was designated as the 11th elephant reserve in the country, naming it as the Shivalik Elephant Reserve (henceforth Reserve), covering an area of 5,405km². The reserve mainly consisted of three protected areas in the state of Uttarakhand, namely, the Jim Corbett National Park, Rajaji National Park, and Sonanadi Wildlife Sanctuary, apart from some other reserve forests. As per the recent estimates carried out by the state government in the year 2015, it was revealed that the state harbours nearly 1,800 elephants (Uttarakhand Forest Department 2015). The estimation also reveals that the Reserve has been maintaining a viable population of elephants for the last two decades, and it averaged at $1,572 \pm 319$ (range 1,346–1,797). In the Shivalik Elephant Reserve, the male-female ratio of elephants in Rajaji and Corbett national parks was recorded as 1:1.8 and 1:1.5–2.1, respectively (Williams 2002), however, another study

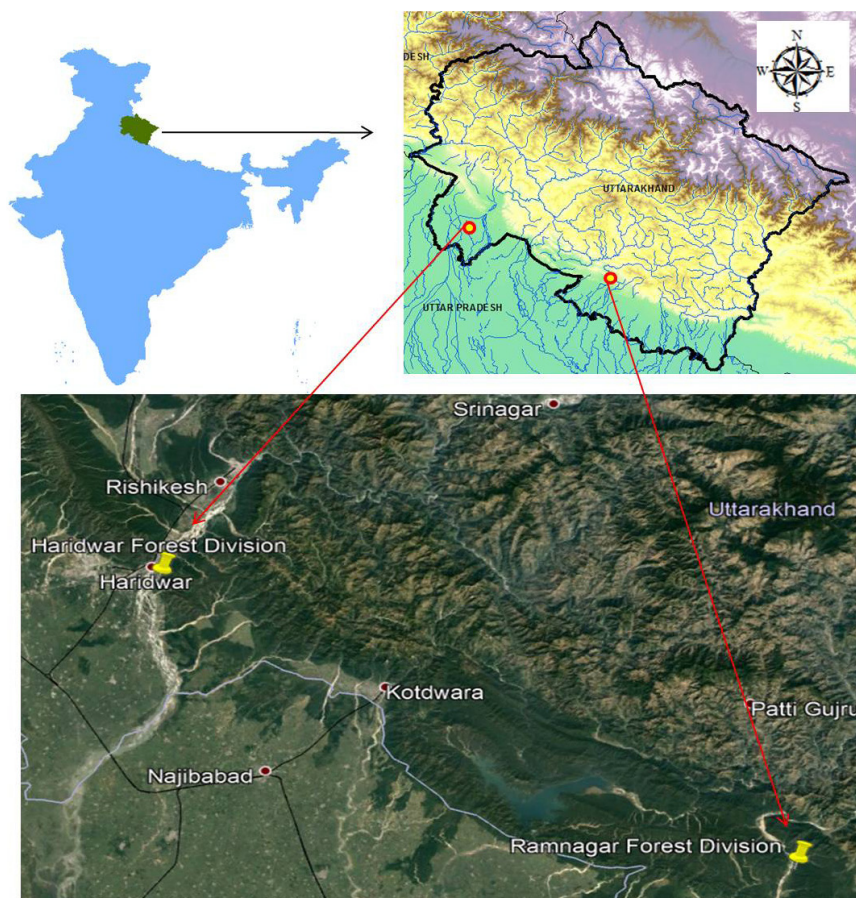


Image 1. Location of the study area in India, with the sites pinned from where the elephants were recorded feeding on the garbage (map prepared using Google Earth).

carried out in Rajaji National Park indicated that the male-female ratio of the elephants is 1:4.4 (Joshi et al. 2007). All these figures, if taken into account, reveal that the Reserve consists of a healthy population of elephants.

Unfortunately, the Reserve is suffering from the consequences of negative man-elephant interactions. Rapidly increasing demand for land for habitation, agriculture, industries, and unsustainable land-use practices have overarching negative impacts on the large migratory corridors of the elephants. Incidences of straying of elephants in crop fields and habitations, human encroachments into forest areas, and killing of humans by the elephants are increasing. Linear infrastructure developments in the form of roads, railway lines, power lines, and canals add to the problems in some of the habitats across the Reserve.

Case Study-1: Shyampur Forest in Haridwar Forest Division

The first observation of concern was made during the year 2007 from Shyampur Forest Range of the Haridwar Forest Division, now a part of the Rajaji Tiger Reserve, wherein a bull elephant was found feeding on a garbage dump lying along the east Ganga canal (29.92°N, 78.17°E; Image 2). This garbage belonged to the city of Haridwar and was being thrown at the site for about two decades (from the year 1995 to 2015) in about 0.32km² of the land. The garbage consisted of both biodegradable and non-biodegradable solid wastes, including the waste generated at Har-ki-Pauri from the tourist aggregation, hospitals, and industries. The dumping site was being used mainly for land filling. Since the garbage contained leftover food and the remains of flowers and leaves, the elephants were found attracted towards the dump. This garbage not only affects the environment but also exposes the wild animals to an unpredictable threat.

An inspection done by the state forest department during the year 2015 at Shyampur forest indicated that at a few places, the biodegradable and non-biodegradable waste, originating from Haridwar City, was not being disposed-off properly (Anonymous 2015). Between the years 1995 and 2015, more than 100,000 ton of garbage has been dumped in this site every year, including 300 tons of garbage every day from the Haridwar Municipal Corporation (Sharma 2015). Fortunately, in the year 2015–2016, the Corporation started dumping of the city's garbage in a piece of government land near Sarai Village in Haridwar. Since the year 2016, any kind of garbage is not being thrown at the east Ganga canal site. Elephants use this track to visit the river Ganga crossing



Image 2. An adult male Asian Elephant feeding from the waste near Shyampur forest of Haridwar Forest Division in the year 2007 (now is a part of Rajaji Tiger Reserve).

the Haridwar-Bijnor National Highway. This forest is also a connecting chain for elephant movement in between Rajaji and Corbett tiger reserves.

Case Study-2: Kosi Forest in Ramnagar Forest Division

The second observation was made during the year 2017 in the Kosi Forest Range of the Ramnagar Forest Division, wherein some pieces of plastic bags were found in the dung piles of an elephant (29.45°N, 79.15°E; Image 3). This division is adjacent to Corbett Tiger Reserve and is a potential tourism zone. Though any permanent garbage dumping site was not found in and adjoining areas of the division, it was assumed that the elephants probably ate plastic bag either from the garbage being thrown by the pilgrims in Sitabani Temple or from the Chhoi Village near Ramnagar City. The Sitabani Temple is situated in Kota Forest Range, and is well connected to the Kosi Forest Range (7–8 km from the spot from where the observation was made). Every year thousands of tourists and local villagers visit the temple and notably the waste from anthropogenic activities and the remains of the offerings along with the plastic bags are scattered in the surroundings. In order to minimize the use of plastic bags, the forest department started distributing jute carrybags to the tourists in the year 2017.

Similarly, Chhoi Village is located about five kilometers from Ramnagar City, wherein garbage was observed being thrown by the local people along the Ramnagar-Haldwani motor road. This area is a connecting corridor for elephant movement across Ramnagar and Terai West forest divisions. The presence of Kosi River further



Image 3. The remains of plastic bag recorded from the dung-piles of elephant in Kosi forest of the Ramnagar Forest Division.

facilitates the frequent movement of elephants across the area. The garbage accumulated at both the sites (in Sitabani Temple and Chhoi Village) was found temporary. On examining the garbage, it was found that the garbage mainly consisted of leftover food, vegetable residues, wrappers of chips, etc.

DISCUSSION

Impacts of garbage-feeding on elephant

Improper management of waste can lead to substantial and irreversible environmental, economic, and social impacts (Dunjic et al. 2017). Though there are only a few reports of elephants feeding on garbage, observations made from the Haridwar and Ramanagar forest divisions indicates that the garbage dumping sites near elephant habitat may pose a threat to them. On several occasions, species like Spotted Deer, Barking Deer, Sambar Deer, Wild Boars, and Rhesus Macaques have also been observed feeding on garbage lying across protected areas. Even several birds like house crow, babblers, doves, little egrets, and black kites were also recorded hovering and feeding on garbage dumps.

Selective feeders with specialized feeding apparatus

(mouth or hand parts) such as primates or insectivorous birds may be less susceptible to plastic ingestion and phthalate accumulation (Hardesty et al. 2015) compared to elephants, ruminants or carnivores, which are incapable of selectively retrieving food contained in plastic (Katlam et al. 2018). Plaza & Lambertucci (2017) pointed out that the species that take advantage of feeding in the garbage dumps consisting of organic waste can produce negative impacts on other species, which do not use to feed on the dumping sites. They also indicated that the probability of pathogen infections, poisoning, foreign body ingestion may be high and such feeding may also change the pattern of movement, migration, home ranges size, and behaviours of the individuals. This change in the movement patterns can have different ecological consequences as well, like changes in pathogen distribution, which the species carry (Mc Kay & Hoyer 2016).

Such reports were also received from Mudhumalai Tiger Reserve, southern India, wherein elephants were found feeding in the dump yards, which were in the middle of an elephant corridor (Ganesan 2016). Even male elephants were found breaking the electric fence to enter garbage dump areas in Silver Clouds in the Gudalur area in the Nilgiris (Oppili 2016). Open garbage dumps have also been recorded as a prevalent problem in Sri Lanka. A detailed study carried out by Fernando & Pastorini (2006) on the elephants in and around Wasgamuwa National Park of Sri Lanka revealed that elephants use garbage dumps to feed on edible items on a regular basis; even plastic bags were recorded in the dung piles of elephants during the study in the year 2005. The death of an elephant was also recorded in Sri Lanka in March 2017, which was found regularly eating garbage at Manampitiya (Rodrigo 2017). In this context, the study and comments by Katlam et al. (2018) is of significance about the risks resulting from garbage dumps and the shift in food habits of some wild animals.

Legal provisions and recommendations

In the year 2011, the Ministry of Environment and Forests prepared draft guidelines for ecotourism in and around protected areas (MoEF 2011) in which the emphasis was on banning of burning or disposing non-biodegradable waste within the protected area or in surrounding eco-sensitive zone or buffer area. Since garbage dumps may spread bacterial infection and induce behavioural changes in elephants, it is recommended that a plan of action is needed to be prepared for proper dumping and disposing-off of garbage, especially across protected areas.



Rajaji and Corbett national parks lie in the Shivalik Elephant Reserve in northern India, wherein a large number of tourists arrive to observe wildlife in their natural habitats. Considering that the number of tourists is increasing every year, improper waste disposal practices across the protected habitats may affect wildlife significantly. In order to minimize the impact of garbage on elephants, formulation of an action plan for solid waste management (with adoption of at-source segregation approach) for the Shivalik Elephant Reserve needs to be developed. Besides, tourists and local people need to be sensitized about the harmful impacts of garbage dumps, especially plastic bags, using nature education, and awareness tools.

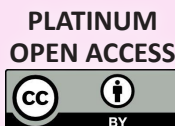
Garbage dump and landfill sites should be shifted away from the outskirts of protected habitats and wildlife corridors; this approach will be helpful in minimizing the exposure of wildlife to harmful wastes. Likewise, by collecting data on existence of garbage dumps across the protected habitats of elephants and initiating a study to better understand the level of impact of garbage dumps on the behaviour of elephants, we would be able to know whether these dumps are changing the behaviour and activities of elephants or not.

To achieve the objectives contained in the Indian Wildlife (Protection) Act 1972, Solid Waste Management Rules, 2016 and Guidelines for Declaration of Eco-Sensitive Zones around National Parks and Wildlife Sanctuaries, there is a need to sensitize people about effective ways of waste management and about the functional role of species in maintaining the ecosystem and biodiversity. Moreover, ensuring local community and stakeholder participation in conservation initiatives and habitat monitoring would be an effective management and conservation strategy.

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