

# Ecology of Indian Crested Porcupine (*Hystrix indica*) in and around Jodhpur, Rajasthan.

*Western Rajasthan is the mixture of an arid and semi-arid region, which has a huge desert called 'The Great Indian Thar desert'. It is rich in biodiversity and comprises many unique endemic species. Indian crested porcupine is monogamous species, which is nocturnal and herbivore. The study area of the porcupine is unique and it is present in west part of Jodhpur city. Our study areas included 'Bhooteshwar Van Khand' (Forest area), outside west part of Jodhpur city wall lies in a semi-arid region where different behavior (burrow, feeding, breeding etc) and other activity of ICP were studied. During the study, it is found that change in behavior and activity of porcupine is mainly due to anthropological factor, which makes them survive in this conditions. Road accident and predation by dogs are the major threat to their population in this area. Detail study is needed to study the effect of food preference habit and interspecific interaction with the human.*

**Key words:** Thar desert, Indian crested porcupine, Activity, and Behavior.

## Introduction

West part of state Rajasthan includes the huge desert and definite geographical distribution in India, which is known as The Great Indian Thar Desert (GITD). GITD is extended over parts of Gujarat, Rajasthan, Punjab, and Haryana, ranging into Pakistan. It covers about 446,000 km<sup>2</sup>, of which 208,110 km<sup>2</sup> lies in India and rest in Pakistan (Idris *et al.*, 2009). The Jodhpur city is located at eastern peripheral of GITD (latitude 26°18'N and longitude 73°08'E) and is a semi-arid region (Lal *et al.*, 2016). Habitat in and around Jodhpur has comprised the mixture of different topography which includes sandy scrubbed, rocky scrubbed, agricultural land, wetlands, etc.

Indian crested porcupine (*Hystrix indica*) (ICP) is monogamous species with distinguished features like having long modified hairs called as 'spines' or 'quills'. On tail, quills are white and large called as 'rattling quills' which has gained utmost development in this species. ICP when threatened, alarmed, or irritated, it erects its spines and rattles their hollow tails quills (Fig. 4). Its body length ranges around 30-35 inches, weighing 12-20 kg and spines length around 6-8 inches. ICP is nocturnal, generalist species, burrow-dwelling rodents. ICP favors rocky or hilly areas and adapted to survive in any climatic conditions. Burrows is not obligatory to shelter, they lie up in thick scrub near cultivation and in the Terai, they commonly shelter in the tall grass in the crop season. (Prater, 2014; Synder *et al.*, 1997). ICP has prevalent distribution and often considered a pest by farmers and gardeners in the west part of Rajasthan. ICP is significant to an ecosystem as it disperses vegetative propagules of plants (geophytes) (Gutterman and Herr, 1981; Gutterman, 1982).

## Material and Methods

### Study area

Our study areas included 'Bhooteshwar Van Khand' (Forest area), outside west part of Jodhpur city wall lies in the semi-arid region where study on behavior and different activity of ICP were carried out. Other sites include different parts/areas in and around Jodhpur city for distribution only.

*The changes in behaviour and activity of Indian Crested Porcupine is mainly due to anthropological factor.*

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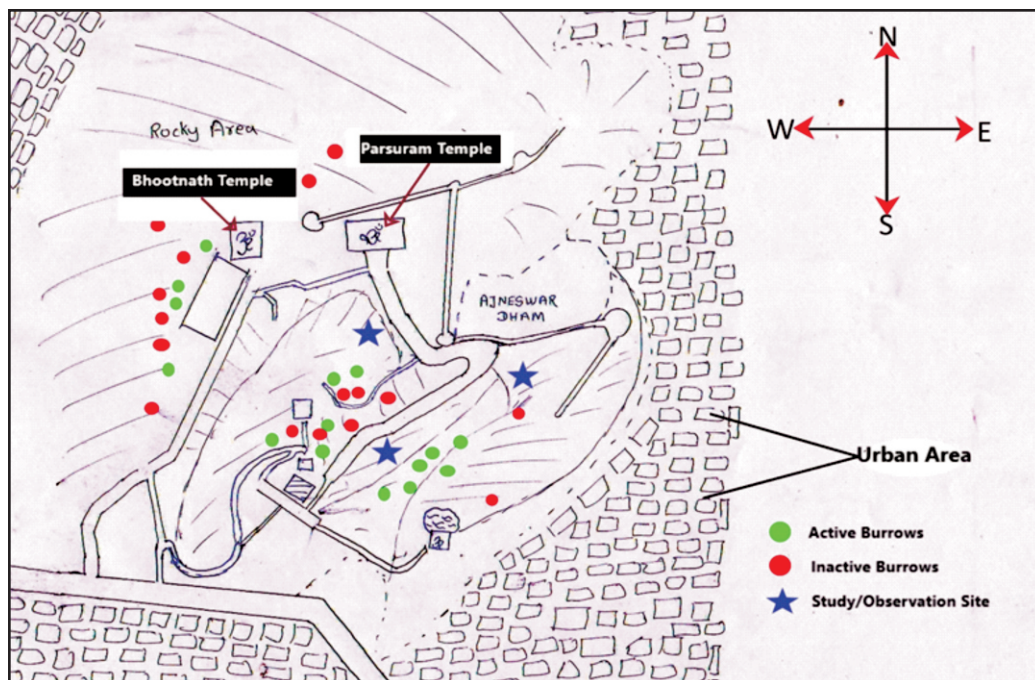


Fig. 1: Sketch view of study area showing active/inactive burrows and study sites.

Bhooteshwar Van Khand is small forest area, which is surrounded by urban areas (Fig. 1). In Bhooteshwar Van Khand there are many old temples present mainly called Jagnath Mahadev, Eklang Ji Mahadev, Bhoothnath Mahadev and Parsuram Mahadev. The study was carried out near two sites viz Bhoothnath Temple and Parsuram Temple, which are connected, and forms belt for ICP territory and home range. Bhooteshwar Van Khand areas cover around (estimated) 5-8 km<sup>2</sup> areas. Bhooteshwar Van Khand is scrubbed hilly areas. Temperature varies in accordance with the season, which generally ranges between 5°C to 45°C. This terrestrial habitat is rich in reptiles, aves, and mammals. Mammal mainly desert hare and Indian crested porcupine are there but a hybrid desert cat and Indian civet also have reported by us first time at this sites while fieldwork.

## Methods

An extensive field survey was conducted between April 2016 to Sept. 2017 and regular visit was conducted every month to understand different behavioral patterns of ICP. Data of rainy (July to September), winter (November to February) and summer (April to June) season were collected. For studies, direct observation, photography, survey, interview and Altman, 1974 field technique- mainly focal sampling method were followed. Scats were collected on transects, tracks, and roads whenever encountered within the intensive study area. All collected scat sample was tagged with the name of the species, date and GPS coordinates. Five sites within 2 km<sup>2</sup> area were selected for regular monitoring of ICP.

## Results and Discussion

During the study period from April 2016 to Sept. 2017, about 40-45 porcupine have been encountered in the 2-3

km<sup>2</sup> area (Bhootnath temple and Parsuram Mahadev Temple area). Population density at study area is calculated by estimated observed species divided by land area under study has resulted in 15-18 per km<sup>2</sup> area. The total estimated population density of study area (Bhooteshwar Van Khand) is around 13-16 porcupine per km<sup>2</sup> area. Feeding, breeding, foraging, and activity time and the route was observed at study sites. Their active and inactive burrows were counted and closely observed. Another sighting of ICP observed at Rocky and Hilly area includes Machiya Biological Park, Kaylana lake area, Arna-Jharna, Balesar, Phitkasni, Buchati (Bhopalgarh), Daijar, Beriganga, Rao Jodha Desert Park and other sites include sandy scrubbed desert area of Guda Bishnoi, Luni river belt area, Devaliya, Dangiawaas, Luni village and agricultural areas of Jodhpur.

## Self-constructed burrow and Leftover burrow habit

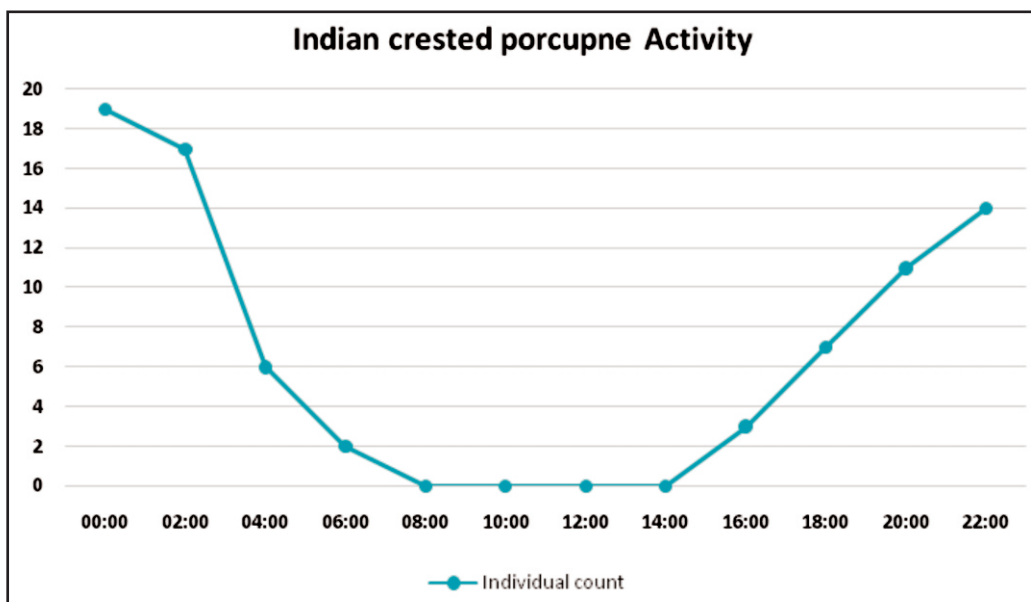
Burrows of ICP is the refugee for many species (Taber *et al.*, 1967; Bhupathy and Ramesh, 2010; Bhupathy and Haque, 1986). ICP generally construct their own burrows which are tunnel-like having multiple openings. Thirty-one burrows of ICP at study sites have been reported, out of which 15 burrows are active. It is observed that few burrows were burnt by human and few were closed by placing stones (Fig. 3). We removed the stones and re-opened these burrows. Burrows having multiple connected tunnels. Maximum burrow length has observed 24.5 feet long and average size ranging between 15-18 feet long at the study area.

It is observed that ICP occupies other abandoned burrow/den of other species. During the study, it is found that ICP occupied shelter in den previously constructed by desert fox (*Vulpes vulpespusila*). This den now called burrow constructed beneath *Capparis decidua* (Ker) plant

**Table 1:** Frequency of sighting Indian crested porcupine near Jodhpur during (2016-2017).

S.No.	Time of Study	Feeding Site 1	Feeding Site 2	Feeding Site 3
1	Morning (05:00-10:00 AM)	+++++	+++	+++
2	Afternoon (12:00- 04:00 PM)	-	-	-
3	Evening (04:30-08:00 PM)	+++++	+++	+
4	Night (08:00-12:00 AM)	++++	+++	+++

Note: \* - (No sighting), + (Very Rare), ++ (Rare), +++ (Moderate), ++++ (Common) and +++++ (Very common in activity).



**Fig. 2:** Indian crested porcupine activity based on their sighting frequency in 24 hours day cycle (X-axis- time interval; Y-axis- Individual average count).

under sandy areas. ICP shelter in such den/burrows when their burrows are damaged, under predation, disturbed and depends on resources availability. Although ICP constructs their own burrows.

#### Change in feeding behavior

ICP generally are herbivore but sometimes they feed on small lizard, skink, and worms. The present study site situated near temples so their feeding habit was observed a change. People due to religious aspects feed birds (pigeon, house sparrow and other) with cereals, bread and biscuit thus ICP at night found to be feed on these foodstuffs. This availability of man-made food has changed its behavior but it has become a major cause of survive in such area which is surrounded by urbanization. An experiment was conducted to understand ICP's diet preference over natural and man-made food. In this experiment plant parts were placed on tracks of ICP and at feeding sites where people feed birds or mane made food. It is found that out of 20 trial 15 times ICP prefer bread/biscuit, etc. (Fig. 6) and they did not feed on plants placed on their tracks. This provisioning has modified their daily routine and behavior.

#### Breeding behavior

ICP breed in separate burrows where they live. Gestation

is about 110-115 days and they have 2 to 4 young in March (Prater, 2014). At study sites, 4 families were observed. Their mating was observed in July, just beginning of monsoon in western Rajasthan and in another record of mating observed in September-October (Fig. 5). This variation in timing of mating is due to oestrous cycle difference in a female. ICP with young has observed during this period. Female porcupine rears young until they get adult and after becoming an adult they construct another burrow or use leftover burrows. During observation (6:35 pm with 100-170 lumens of brightness) male and female ICP came out of burrow and female bent down extending her tail quills to attract a male. In this study, 4-5 attempts of short period (4-6 second) for mating were observed. Another mating observed at feeding sites at night (9:07 pm).

#### Daily activity schedule

During the study, it is found ICP come out from burrow after sunset around 20-30 lumen of daylight brightness (recording using android light-meter application). Male comes out first and it inspects and observes the surroundings, thereafter another member of the family follows him and they get split but remain nearby each other. Out of 125 observation readings, 93 times they follow the same track (75% of the time) and remaining 32





Fig. 3: Stones placed by local people on the burrow.



Fig. 4: Indian crested porcupine (*Hystrix indica*) with its erected quills.



Fig. 5: Indian crested porcupine during mating.



Fig. 6: Indian crested porcupine feeding on bread (Roti).

times they follow the alternate track (25% of the time). The alternate track was taken to avoid disturbance or predation. Dogs are being the major predator. During present study 53 cases of dog, attacks have been observed. 7 dead ICP reported out of which 3 died due to road accident while 4 due to the dog attack. ICP as being nocturnal they forage during the night and their home range is observed around the 2-3 km<sup>2</sup> area. Table 1 shows frequency of reporting ICP at different sites and graph 1 shows daily activity based on sightings frequency.

## Conclusion

Large population around 40-45 ICP in the 2-3 km<sup>2</sup> area have been observed at study site which is surrounded by urbanization. This huge population within this small area is due to their behavioral changes and adaption. ICP adjusted itself to new conditions. The observed behavior of ICP at present study sites is different from other areas. It is concluded that their population is maintained due to feeding habit as they are being depended on man-made food and cereals offered by humans for birds. This has affected female ICP oestrous cycle which resulted in temporal matting behavior. Detail study is needed on the effect of food preference habit in ICP results in an altered reproductive cycle. The major threat to ICP is predation by the dog, closing the burrows by putting stones and road accidents.

जोधपुर, राजस्थान में और इसके चारों ओर भारतीय शिखाधारी साही ( *हीस्ट्रिक्स इंडिका* ) की पारिस्थितिकी आजाद पी. ओझा एवं एल.एस. राजपुरोहित सारांश

पश्चिमी राजस्थान एक शुष्क तथा अर्ध-शुष्क क्षेत्र का मिश्रण है, जहाँ विशाल रेगिस्तान है, जिसे 'ग्रेट इंडियन थार रेगिस्तान' कहा जाता है। यह जैव विविधता में समृद्ध है और अनेकों विलक्षण स्थानिक प्रजातियों को मिलाकर बना है। भारतीय शिखाधारी साही एकसंगमनी प्रजाति है, जो रात्रिचर एवं शाकभक्षी है। साही का अध्ययन क्षेत्र विलक्षण है तथा जोधपुर शहर के पश्चिमी भाग में स्थित है। हमारे अध्ययन क्षेत्र में एक अर्ध शुष्क क्षेत्र में अवस्थित जोधपुर शहर दिवार के पश्चिमी भाग के बाहर 'भूतेश्वर वन खण्ड ( वन क्षेत्र )' शामिल है, जहाँ भारतीय शिखाधारी साही के विभिन्न व्यवहार ( बिल, संभरण, प्रजनन आदि ) तथा अन्य कार्यकलापों का अध्ययन किया गया। अध्ययन के दौरान, यह पाया गया कि साही के व्यवहार और कार्यकलाप में परिवर्तन मुख्यतः मानवशास्त्रीय कारक के कारण है, जो इन्हें इस अवस्था में जीवित रखते हैं। सड़क दुर्घटना और कुत्तों द्वारा परभक्षण इस क्षेत्र में इनकी आबादी के लिए प्रमुख संकट हैं। खाद्य पसन्द आदत के प्रभाव तथा मानव के साथ अन्तर्जातीय पारस्परिक क्रिया का अध्ययन करने के लिए विस्तृत अध्ययन की आवश्यकता है।



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