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Community perception towards biodiversity conservation and eco-tourism in imperiled landscapes of erstwhile Closed Areas of western Rajasthan, India

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Abstract

Indian endangered biodiversity was protected under the Indian Wildlife Protection Act of 1972 (WPA 1972) by transforming the natural habitats into Protected Areas – National Parks and Wildlife Sanctuaries. However, a large number of diverse wildlife populations occurred beyond these Protected Areas as is evident in the arid zone of western Rajasthan. During 1980's, Rajasthan State Government issued a gazetted notification to protect unprotected wildlife-rich areas such as "Closed Areas". An amendment of WPA 1972 in 2002 abolished the protection priorities of Closed Areas making them susceptible to local extinction of several species. The current study, aimed to assess the community perceptions towards conservation of such dwindling biodiversity. Awareness and attitude of the local communities towards biodiversity conservation was thus assessed by use of a semi-structured questionnaire-based interview among 3357 people in 2470 households across seven erstwhile Closed Areas in western Rajasthan so as to explore the possibilities of bringing these areas under the recently introduced protective regime of "Conservation Reserves" or "Community Reserves". Anthropogenic offences in the absence of designated protection mechanism were held responsible for biodiversity degradation by government reports. Eco-tourism shows immense potential in other Indian Protected Areas for biodiversity conservation and economic growth for the local communities. Currently, 31.1% of the total interviewed population were willing to support the future eco-tourism initiatives in the region. Such positivity should be encouraged by the authorities following successful examples of eco-tourism projects in other Indian Protected Areas before the cessation of social enthusiasm for protecting biodiversity.

Keywords: Arid region, Biodiversity, Closed Areas, Eco-tourism, Western Rajasthan

Introduction

During the last century, large mammal populations (mostly wild carnivores and herbivores) have been declining worldwide at an alarming rate (Ceballos & Ehrlich, 2002). The Indian Wildlife Protection Act of 1972 (WPA 1972) introduced two categories of Protected Areas – National Parks and Wildlife Sanctuaries to protect Indian endangered wildlife from various anthropogenic threats such as hunting or poaching, habitat destruction and other natural resource extractions (Singh, 1999). However, large numbers of wildlife have sustained beyond the boundaries of these Protected Areas as well (Ervin *et al*., 2010). Rajasthan, the largest state of India situated at the north-west part of the country, has delineated 30 Protected Areas – four National Parks, 25 Wildlife Sanctuaries and a Community Reserve (http://wiienvis.nic.in/Database/Rajasthan_7836.aspx). The oldest mountain range "Aravalli" divided this state into eastern and western regions. Out of these 30 Protected Areas, only two of them are spatially distributed at the western side of the Aravalli ranges in the arid region of the state (Aggarwal *et al*., 2006). Historically, the arid regions of western Rajasthan accommodated large populations of many significant wildlife species such as critically endangered bird Great Indian Bustard (*Ardeotis nigriceps*), Indian grey wolf (*Canis lupus pallipes*), Indian desert fox or white footed fox (*Vulpes vulpes pusilla*), Indian fox (*Vulpes bengalensis*), blackbuck (*Antilope cervicapra*), chinkara (*Gazella bennettii*), Spiny-tailed lizard

(*Saara hardwickii*) while most of them thrived within the human dominated landscapes for centuries (Mani, 2012).

However, in twentieth century, a loss of biodiversity was imminent in absence of any protection mechanisms. Thus, to protect the large number of threatened species, the State Government of Rajasthan (during the 1980's) published a gazetted notification under section 37 of WPA 1972 for 14,689.71 sqkm of wildlife-rich areas situated outside the Protected Areas (National Parks and Wildlife Sanctuaries) across 17 districts to demarcate them under 33 Closed Areas. The main objective for developing these Closed Areas was to prohibit the 'hunting activities' of large herbivores (blackbuck, chinkara, nilgai *Boselaphus tragocamelus*, wild pigs *Sus scrofa*) during their breeding seasons (Kankane, 2000; Sharma & Mehra, 2009). Out of the total 33 Closed Areas, The Rajasthan State Forest Department delineated 25 Areas in the western side of the Aravalli ranges to deploy the protection-providing management system where previously no conventional protection administration was operational (Bhattacharjee *et al*., 2015). This was a remarkable effort from the State Government to conserve the biodiversity of the region surviving beyond conventional Protected Areas.

However, with the 2002 amendment of section 37 of WPA 1972, these Closed Areas eventually lost their administrative empowerments when wildlife hunting was prescribed all over India. The State Government gradually had to withdraw the designated management personnel from these erstwhile Closed Areas, who were providing protection to the natural habitats and the associated biodiversity. The rural communities living in the arid regions of western Rajasthan from past centuries were mostly engaged in agro-pastoral livelihoods, which were not detrimental to the region's biodiversity (Dutta *et al*., 2014). However, during the last two decades, with the technological advancements in agricultural practices and automobiles, various anthropogenic activities, in the absence of protective management systems in this region, were continually causing threats to the flagship species such as the Great Indian Bustard, Indian grey wolf, blackbuck, Indian vultures declining their populations to an extent of local extinction (Bhattacharjee *et al*., 2015). Therefore, it became essential to conserve these erstwhile Closed Areas under the possible regimes of "Conservation Reserves" or "Community Reserves" where local communities would become stakeholders along with the Government agencies as per the amendment of WPA 1972 in 2002 for future conservation and management associations (Sahabuddin & Rao, 2010).

A few ecological studies (Dookia, 2009; Dutta *et al*., 2014) were conducted in these former Closed Areas to understand the status of the biodiversity of these areas. However, there was a gap in understanding the perception of the local communities living in and around these Closed Areas about the environmental values of these areas along with their ideas on sustainable livelihood opportunities, which could be generated from these areas. Thus, to understand the people's attitude towards biodiversity conservation and to explore the possible measures of their sustainable livelihoods, the current study was conducted. The individuals of the rural communities were interviewed using semi-structured questionnaires to assess their awareness and social enthusiasm required for conserving the threatened biodiversity as well as to find alternative livelihood opportunities to reduce their dependencies on the natural resource extraction. Engagement of rural communities in eco-tourism based operations has already proved beneficial in different parts of India and worldwide as well (Goodwin, 1996; Gossling, 1999; Balmford *et al*., 2009; Karanth & DeFries, 2011; Karanth *et al*., 2012). Thus, the current study aimed to endorse "Eco-tourism" as an effective conservation tool for protecting the rapidly declining wildlife populations in these erstwhile Closed Areas along with the generation of sustainable livelihood opportunities for the rural communities to receive their continual support for the future conservation initiatives in this region.

Methods

Study Area

The current study was carried out across the seven erstwhile Closed Areas under six sites or landscapes - Guda Bishnoiyan (site 01), Fitkashni, Sathin (site 02), Jamba (site 03), Lohawat (site 04), Dechu-Thadiya (site 05) and Doli-Dhawa (site 06). The "Fitkashni" Closed Area was located within Guda-Bishnoiyan (site 01) landscape. These Closed Areas were located across the community owned lands of 98 villages in Jodhpur (94 villages) and Barmer districts (four villages) of the state of Rajasthan (Figure 1). The entire study area was located within the Indian arid or desert biogeographic zone (Rodgers, Panwar & Mathur 2002; Mani 2012). Jodhpur district had the total area of 22,850 sqkm and an altitude variation between 250 to 300 meters above mean sea level. The climate in this region is characterized by very hot summers (temperature rose to 50 ^{o}C), and relatively cold winters (temperature dropped below 0 ^{o}C) and large diurnal temperature differences (Sikka 1997). Water was a limiting factor in this district. Rainfall patterns are also scarce and erratic, at mean annual quanta of 100-500 mm (average 365 mm) that decreased from east to west (Srivastava *et al*. 1998). Thorny Scrub type vegetation is the characteristic of Jodhpur district while the major dominant tree species in open woodlands are *Prosopis cineraria*, *Tecomella undulata*, *Salvadora Persica*, *Zizyphus mauritiana*, *Butea monosperma*, *Acacia nilotica*, *Acacia senegal*, *Azadirachta indica* and *Acacia tortilis* trees. Similarly, major scrublands species were *Capparis decidua*, *Zizyphus nummularia*, *Salvadora spp*., *Calligonum spp*., *Leptadenia spp.* and *Aerva spp*. while *Cenchrus ciliaris*, *Aristida depressa*, *Sorghum halopense*, *Lasisurus sindicus* and *Crotalaria spp*. grasses dominated the vast tract of grasslands. In some rocky areas of Jodhpur district, various *Euphorbia spp*. and *Prosopis juliflora* thickets were also found (Working plan Jodhpur 2013-14 to 2022-23).

The large mammalian species found in this region were the Indian grey wolf, striped hyena *Hyaena hyaena*, Asiatic wildcat or Indian desert cat *Felis silvestris ornata*, desert fox or white footed fox, Indian fox, golden jackal *Canis aureus*, mongoose *Herpestes spp*., chinkara, blackbuck, nilgai, wild or feral pigs, etc. They were frequently seen in areas outside the forestlands as well (Working plan Jodhpur, 2013-14 to 2022-23; Bhattacharjee *et al*. 2015). Similarly, some important avian species found in this area were the Great Indian Bustard, Macqueen's Bustard *Chlamydotis macqueenii*, cream-coloured courser *Cursorius cursor*, sandgrouses *Pterocles spp*., larks, peafowl *Pavo cristatus*, grey francolin *Francolinus pondicerianus*, four to five species of vultures and other raptors or birds of prey. Demoiselle crane (*Anthropoides virgo*) was an important winter migrant, which could also be seen in large numbers near water points of Jodhpur like Kheechan. Spiny-tailed lizard was also another important species of this area. Apart from these wild species, large populations of domestic livestock such as cattle *Bos indicus*, buffalo *Bubalus bubalis*, goat *Capra aegagrus hircus*, sheep *Ovis aries*, Indian camel *Camelus dromedaries* and donkey *Equus africanus asinus* were owned by the local communities in this district. People from "Vishnoi", "Rajput" and "Jat" communities, dominated this region while the residents followed any of the "Hindu", "Islam" or "Jain" religions. The major livelihoods of this region are agriculture, animal husbandry and daily wage based manual labor while a small percentage of people are engaged in services (in both government and private sectors) and business enterprises as well (Working plan Jodhpur, 2013-14 to 2022-23).

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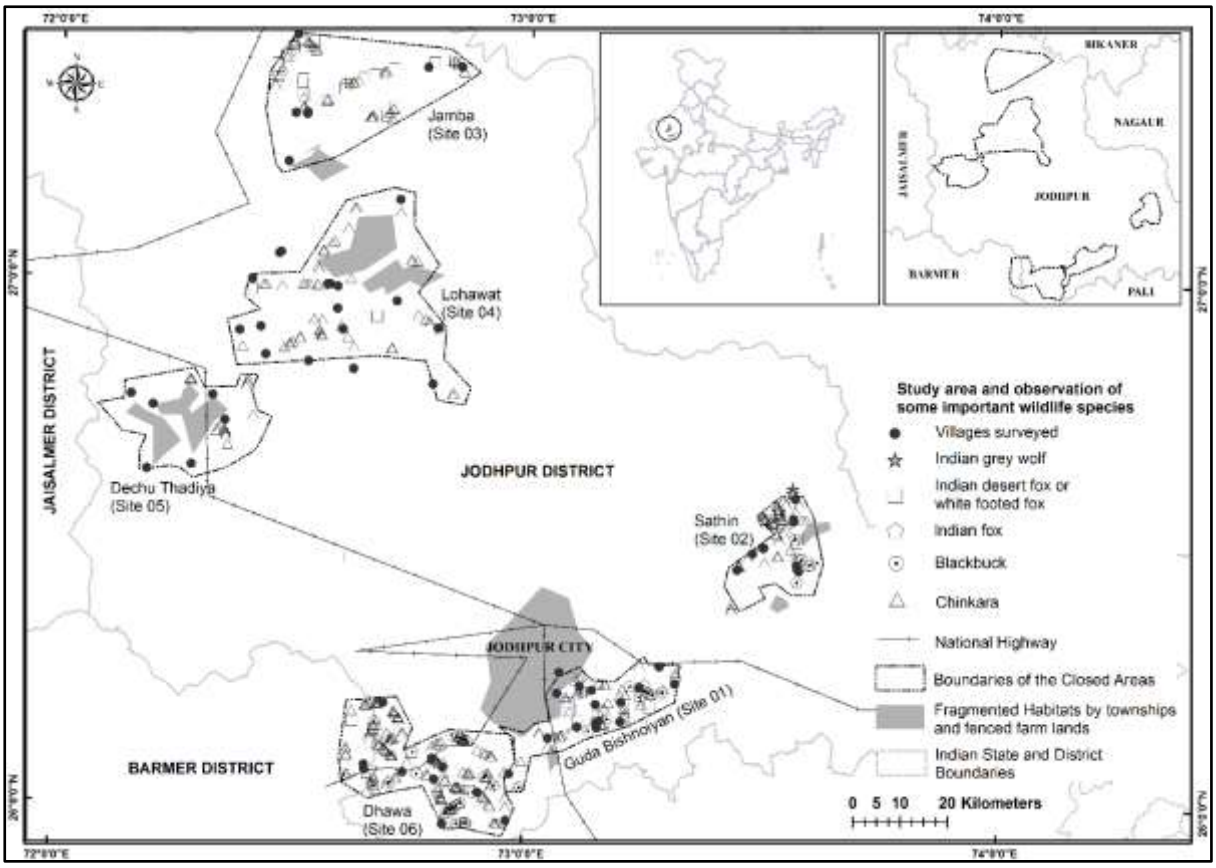

Figure 1. Geographic locations of the erstwhile Closed Areas and observation of some important wildlife species

Questionnaire Survey

Semi-structured questionnaire based interviews (Barriball & While 1994) were carried out amongst the local communities to assess the key problems and potentials of each of the erstwhile Closed Areas and also to understand their awareness towards wildlife conservation and the current management practices. Except two villages in Guda Bishnoiyan area (site 01) which were completely urbanized by Jodhpur Development Authority (JDA), Other 96 villages around the seven erstwhile Closed Areas were surveyed during December 2014 to March 2015. Two percent of the adult population (male and female of more than 18 years old) from each village was interviewed with both open and closed ended questions used so as to understand their attitude and knowledge towards wildlife conservation and related issues. Four teams of trained wildlife biologists accompanied by Rajasthan Forest Department personnel completed the entire task of interviewing the rural people. The questionnaire consisted of three main sections: basic demographic and socioeconomic information about the interviewees; questions related to their opinion towards present status of wildlife, forest and the earlier legal status of the Closed Areas and questions related to the conservation measures to mitigate human wildlife conflict issues including their outlook on the present conflict management system.

The response of the local communities about the conservation scenarios and management issues were binomially coded with 0 and 1. Thereafter, bootstrapping with fifty thousand iterations were performed for each component to obtain a 95% confidence interval for the mean of each response from the respondents using “boot” function of the program R (R Development Core Team, 2006).

Spatial and animal data collection

Land related records were collected from the district's village land and revenue offices (Table 1) while the wildlife census and rescue operation reports were obtained from Jodhpur Wildlife Division office (Table 2). The geographic locations of the all the villages surveyed and the wildlife species observed during the study period were recorded using handheld GPS Garmin eTrex 20 (https://buy.garmin.com/en-US/US/p/87771) and thereafter these geographic locations were plotted in a map (Figure 1) within the ArcGIS environment (ESRI® ArcGIS Desktop version 10.5, Redlands, California, USA).

Results

A total of 2470 households across 96 villages were visited during the study period where 3357 of people, all more than 18 years old, were interviewed. Out of all the interviewees, 2978 (88.7%) were male and 379 (11.3%) were female. Except the respondents of Guda Bishnoiyan (site 01) and Sathin (site 02) Closed Areas, majority of interviewees from all other study sites replied that the status of the "Oran" (Natural habitats or rural community land) around their villages had been degraded during past two decades.

An estimated proportion of 60.5% of the respondents across all the Closed Areas opined that their was a degradation of the Oran around their villages while only 3% people stated the opposite and rest 36.5% people did not find any change in the natural habitats (Figure 2). Out of all the interviewees in Lohawat Closed Area (site 04), 88.6% people reported about the degradation of the natural habitat around their villages. On the issue of status of the wildlife population, 69.3% of the total respondents from the entire study area replied that it had declined significantly within the last two decades while 17.7% people had the opposite understanding and the rest 13% found no change in the status of wildlife during the last two decades (Figure 3).

Furthermore, 97% of the people interviewed in Lohawat Closed Area (site 04) reported about the degradation of wildlife status around their villages in last two decades while nobody from that area suggested that the wildlife population were augmented during that period. The respondents, who opined that the abundance of wildlife was reduced during last two decades, were further questioned to indicate the probable causes of such degradation. A total of 57.3% of these people accused illegal hunting activities of the wildlife as the main reason (Figure 4).

The percentages of interviewees reported habitat destruction, habitat fragmentation and accidents from fast moving motor vehicles and attacks by domestic dogs as other reasons for deterioration of wildlife populations in the study area were 12.9%, 21.3% and 8.5%, respectively (Figure 4). Inversely, people who replied that the abundance of wildlife has been increasing during the past two decades were further scrutinized to indicate the probable reasons of such augmentation. A total of 40.6% of these people replied that more provision of food for the wild herbivores as the main reason while 32% of that group opined that improved availability of water in Jodhpur district as the main catalyst for growth in wildlife population (Figure 5). Similarly, 27.4% people from that group thought that the better protection measures from the cognisant rural communities had increased the abundance of wildlife around their villages (Figure 5). Among all the people opined for the improvements in the status of wildlife, 41.5% people from Guda (site 01) and 41.7% people from Dechu (site 05) provided credit to the protective responsibilities of their respective communities for the improvement of the wildlife abundance.

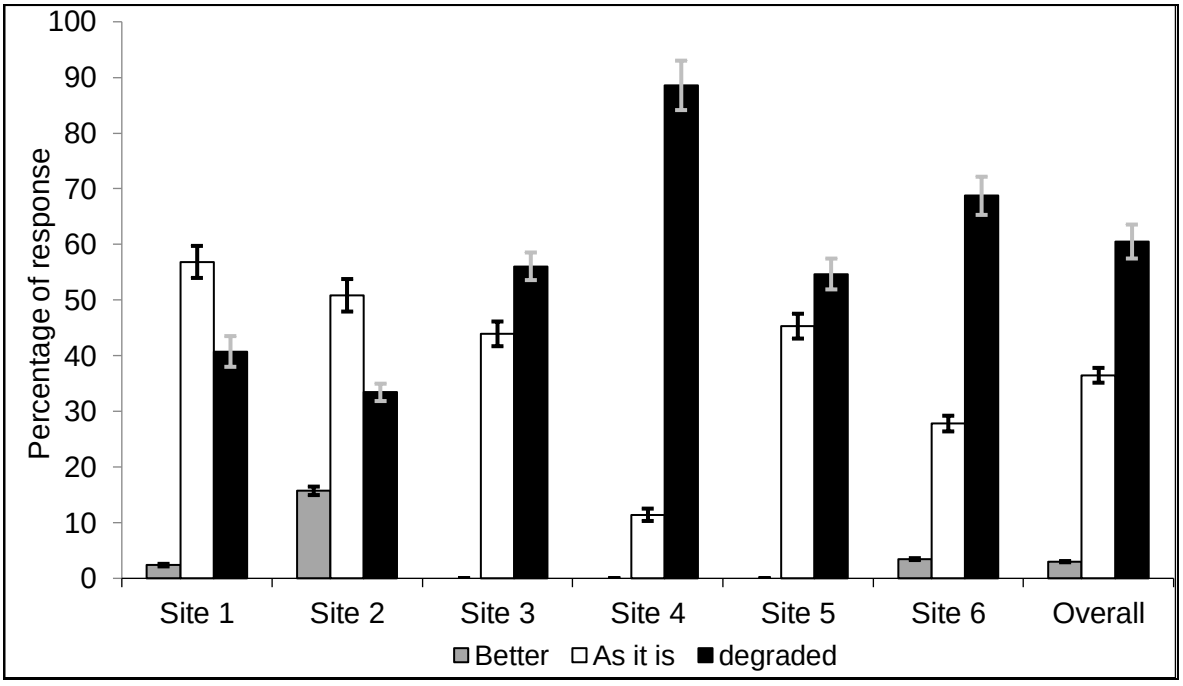

Figure 2. The percentage response patterns from the interviewees across the study area regarding the change of the Oran (community owned natural habitat) around their villages during the last two decades

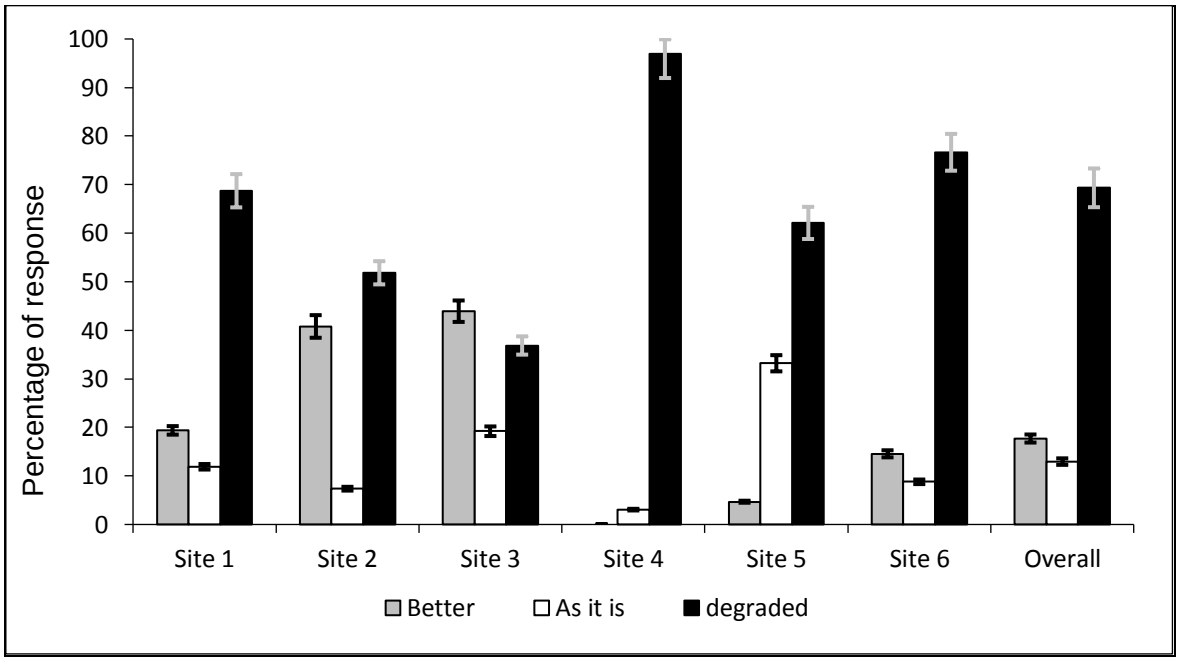

Figure 3. The percentage response patterns from the interviewees across the study area regarding the status of the wildlife in the region during the last two decades

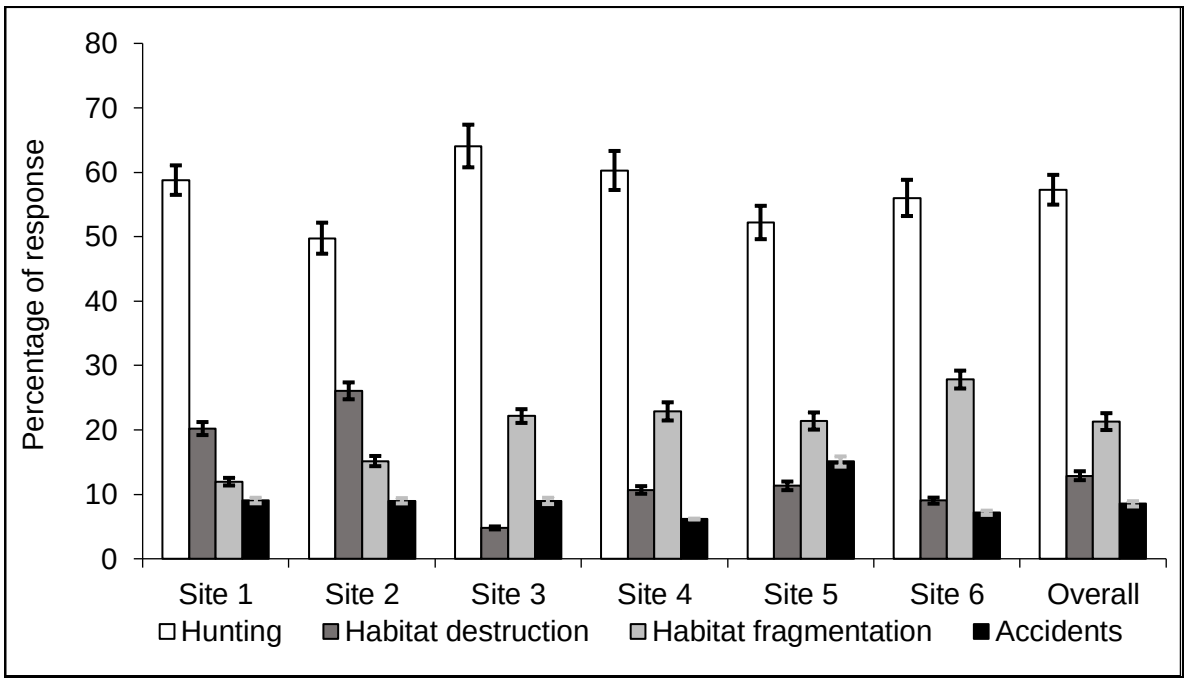

Figure 4. The percentage response patterns from the interviewees across the study area regarding the reasons for decline in the wildlife population around their villages during the last two decades

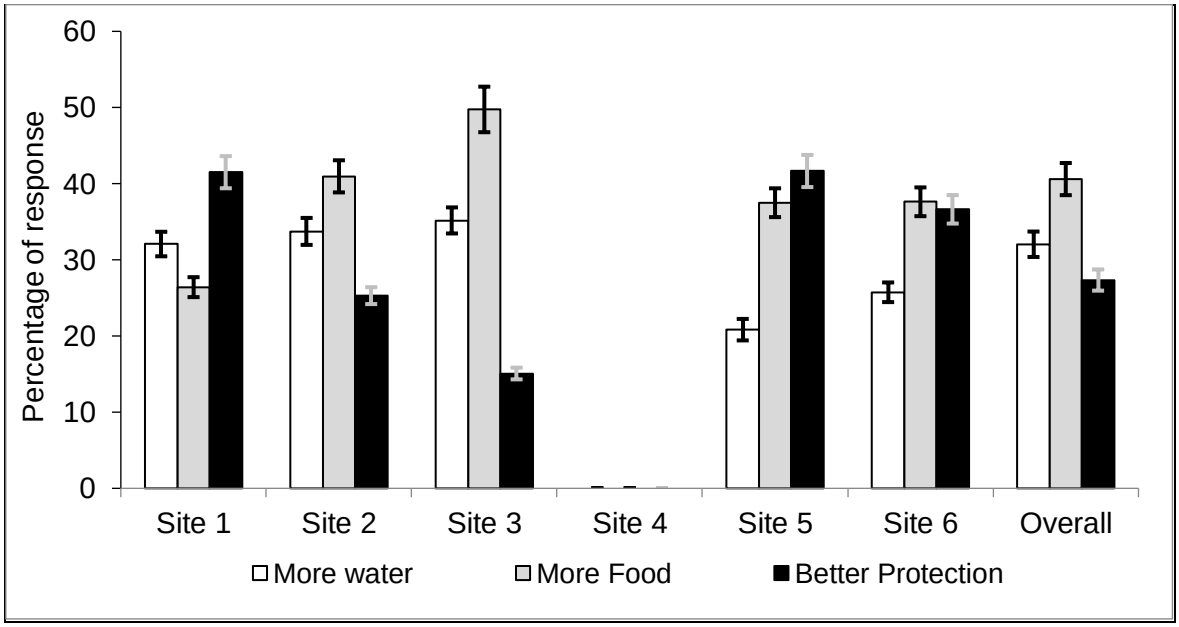

Figure 5. The percentage response patterns from the interviewees across the study area regarding the reasons for improvement in the wildlife population around their villages during the last two decades

Regarding their relationship with the State Forest department, except for respondents from Guda Bishnoiyan (site 01) and Sathin (site 02) Closed Areas, the majority of the people from other erstwhile Closed Areas expressed their dissatisfaction. Overall 57.3% of the interviewees across all the study sites expressed negative feelings regarding their relationship with the Forestry Department, while 26.4% of them had a positive relationship with the department (Figure 6). The rest accounting for 16.3% of the respondents replied that they had a neutral relationship with the Forestry Department (Figure 6). Regarding the previous legal status of the Closed Areas, 68% of all the interviewees replied that they did not appreciate their surroundings to be demarcated under any protection regime whereas only 11.4% of them accepted it well and rest 20.6% of them stayed neutral being unwilling to comment on this

African Journal of Hospitality, Tourism and Leisure, Volume 7 (2) - (2018) ISSN: 2223-814X

issue (Figure 7). The higher percentages of people in support to the legal declaration of Closed Areas were found in Sathin (site 02) and Dhawa (site 06) Closed Areas as 21.9% and 16.1%, respectively. Overall, 31.1% of the interviewees supported the notion that eco-tourism initiatives be undertaken around their villages where 50.3% of them did not approve such ideas and rest 18.6% people stayed neutral on this issue (Figure 8). The higher proportion of people who supported the eco-tourism initiatives were from Guda (site 01 – 48.6%) and Sathin (site 02 – 43.2%) Closed Areas while majority of the people from Jamba (site 03 – 66%) and Lohawat (site 04 – 60.3%) expressed their disagreements towards eco-tourism related activities.

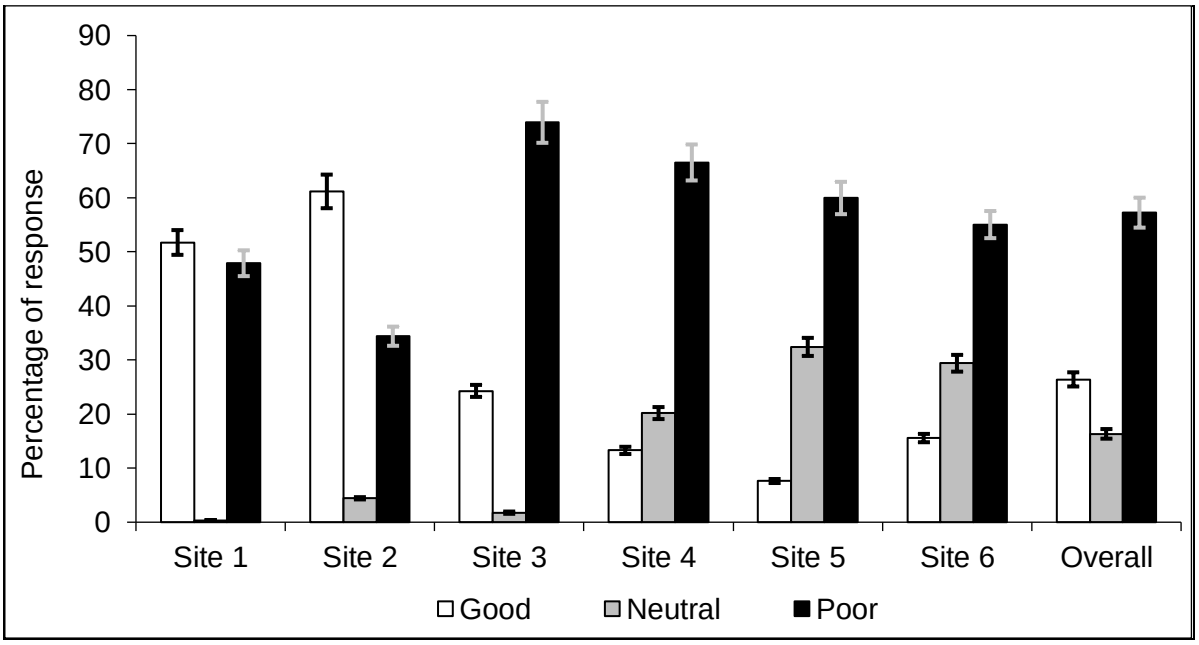

Figure 6. The percentage response patterns from the interviewees across the study area regarding their relationship with the State Forest Department during the last two decades

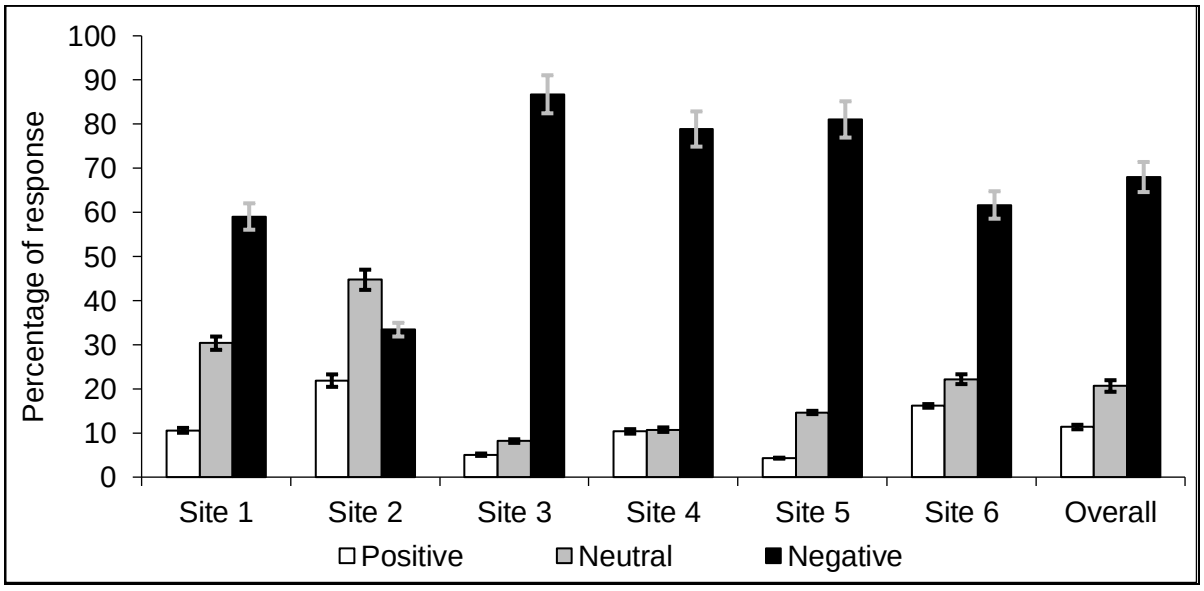

Figure 7. The percentage response patterns from the interviewees across the study area regarding their opinion on the legal status of the former Closed Areas around their villages

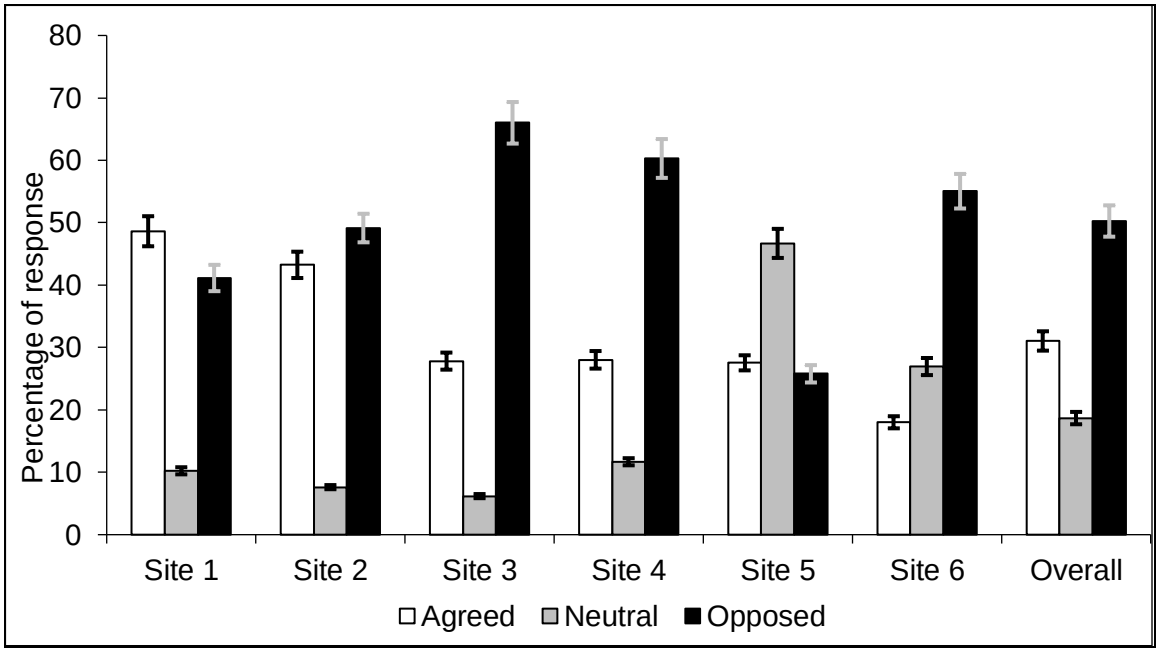

Figure 8. The percentage response patterns from the interviewees across the study area regarding their opinion regarding the Eco-tourism initiatives in the Oran (community owned natural habitat) around their villages

The total geographical extent covering these seven erstwhile Closed Areas was estimated as being some 3870.93 km^2 where the Lohawat Closed Area (site 04) had the largest spatial coverage of 1242.3 km^2 (Table 1). A total of 885.5 km^2 of the Oran (Natural habitats or rural community land) was available across the study area where Lohawat (site 04) had the maximum area of Oran as 281.8 km^2. According to the percentage value, 22.9% of Oran was still available for the previously demarcated Closed Areas. The official waterhole count based herbivore census information during last two decades showed a decline in the population of chinkara and blackbuck while the population of nilgai increased during this period (Table 2).

During last seven years, a total of 5079 wild animals (mostly chinkara and blackbuck) were found injured by the Jodhpur Wildlife Division across the study area. They were eventually rescued and given treatment. However, a total of 3888 individuals could not survive even after the rescue operations, while 1191 individuals could be saved and released back to their natural habitats.

Table 1. The land related records obtained from the Jodhpur district land and revenue offices

Name of the Closed Area	Total extent of the Closed Area declared (km^2)	Oran area remaining currently (km^2)	Extent of Oran as Percentage values of the Closed Areas
Guda Bishnoiyan (Site 01)	424.58	177.97	41.92
Sathin (Site 02)	242.86	28.18	11.60
Jamba (Site 03)	870.24	244.16	28.06
Lohawat (Site 04)	1242.31	281.76	22.68
Dechu Thadiya (Site 05)	666.18	23.12	03.47
Dhawa (Site 06)	424.76	130.31	30.68
Total	3870.93	885.50	22.88

Table 2. Official census results (water hole count) of large herbivores during last 20 years and records of the rescued injured wildlife (mostly chinkara and blackbuck) and their subsequent fate after treatment carried out by the wildlife division of Jodhpur district during last seven years

Sl. No.	Year	Population of Blackbuck	Population of Chinkara	Population of Nilgai	Total Rescued wildlife (herbivores)	No. of animals survived after rescue	No. of animals died after rescue
1	1995	3173	5707	548	---	---	---
2	1996	3426	5449	348	---	---	---
3	1997	3308	3644	723	---	---	---
4	1998	3873	5768	781	---	---	---
5	1999	3565	7336	1348	---	---	---
6	2000	---	---	98	---	---	---
7	2001	---	---	---	---	---	---
8	2002	8927	6513	3186	---	---	---
9	2003	2307	5333	266	---	---	---
10	2004	3888	7454	589	---	---	---
11	2005	2488	9495	806	---	---	---
12	2006	---	---	---	---	---	---
13	2007	1305	3659	323	---	---	---
14	2008	1354	3956	465	362	70	292
15	2009	1126	3489	498	621	114	507
16	2010	1197	4463	701	1008	216	792
17	2011	1883	7682	1087	678	236	442
18	2012	2784	7806	1848	862	238	624
19	2013	2795	7824	1859	641	139	502
20	2014	2117	5190	1420	907	178	729
Total animals involved in rescue operations during April 2008 to January 2015					5079	1191	3888

(--- Data not available)

Discussion

The current study was conceptualized to understand the need for understanding community perceptions towards conservation strategies aimed at improving the status of natural habitats and associated wildlife in the erstwhile Closed Areas within arid biogeographic zone of western Rajasthan. This study estimated the baseline status of different biotic and abiotic components such as natural habitat and large herbivores in this region from people's perception as well as from official records maintained in government offices. Despite being one of the most densely populated arid landscapes in the world, inhabited by 54.95 people per sqkm, this landscape harbours a historical distribution of a large population of wild ungulates such as chinkara, blackbuck, nilgai, and wild pigs (Sharma & Mehra, 2009). Simultaneously, this area supported a significant abundance and diversity of wild canids such as the Indian grey wolf, Indian fox, white footed fox, golden jackals and hyenas (Mani, 2012). However, habitat destruction, and landscape fragmentation due to agricultural advancements and conversion of rural areas into urban and sub-urban colonies affected the natural habitats and the wildlife populations at a rapid pace (Bhattacharjee *et al*., 2015). Previously much of this landscape was the abode of the critically endangered bird the Great Indian Bustard, but now this avian species is not occupying most of this region as it has done previously (Dutta *et al*., 2014). The waterhole count based herbivore census information of Jodhpur district during 20 years and rescue operation reports of seven years were collected from the Jodhpur Wildlife division during the

study (Table 2). Fast moving vehicular traffic around the newly developed wider roads, domestic dogs and barbed-wired fencing across the farmlands were found to be the major reasons for most of these injuries and mortalities of the wild ungulates in this region. These official data from State Government illustrated a sharp decline in the wild herbivore population with high rate of mortality (Table 2). During the seven years (2008-2014), around 3900 wild ungulates (mostly blackbuck and chinkara) could not be saved during post-rescue operation. Therefore, within a naturally low productive desert ecosystem if this adversative pattern persists, the future will be very bleak for the surviving wildlife population in this region. Studies such as those by Dookia (2009) and Dutta et al. (2014) also showed similar concern for population decline in wild ungulates of the desert ecosystem as well as a rapid reduction in their natural habitats.

The current study also disclosed that the local communities of western Rajasthan were cognisant of the decline in the status of wildlife and natural habitats. Simultaneously, a communication gap between the government agencies and the local communities was identified as only 26.4% of all the respondents acknowledged a positive relationship between them and the local forest management. Compared to the vast geographical area, these Closed Areas were found to be highly understaffed during the study period and this might probably be one of the major explanations for a dearth of any meaningful interaction or communication with the local communities. Despite this communication gap, more than 30% of the local communities were willing to support the government agencies for various conservation-oriented activities. This positive strength and social support should be applied for eco-tourism and related wildlife management initiatives of this region before everyone becomes reluctant to engage further.

Questionnaire surveys conducted with the local communities revealed that during the last two decades, with the agricultural expansions and extraction of ground water by powerful bore wells and pump sets, the cropping pattern of this desert region had been changed from one crop in monsoon (kharif) to both rabi (winter) and kharif crop patterns. Therefore, many of the private landowners started erecting higher (six to eight meters in height) barbed-wired fencing around their farms to protect it from crop-raiding wild ungulates. Wherever the ground water was non-saline, construction of tall barbed-wired fencing by the large-landowners was a common phenomenon (mostly observed in Lohawat, Dechu and Sathin Closed Areas). This practice fragmented the landscapes and deteriorated the continuity of the natural habitats for the wild ungulates to survive. It also affected the movement and feeding patterns of the wild ungulates providing permanent restrictions. Therefore, wherever the underground water was saline (in Guda Bishnoiyan, Dhawa and Jamba Closed Areas), the cropping cycle was single (kharif crops) dependent on monsoon. In these areas, agricultural fields were not fenced off so as to provide a continuous landscape to assist the ecologically sustainable movements, reproduction and feeding activities of the wild herbivores (Bhattacharjee *et al*. 2015).

In India and other emerging global economies, growth in eco-tourism offers several opportunities and challenge as well to the conservation initiatives. Previous studies (Sekhar 2003; Spiteri & Nepal 2008; Andam *et al*. 2010; Karanth & DeFries 2011; Karanth *et al*. 2012) have shown that the success of eco-tourism and related conservation initiatives depends mostly on the sharing of economic benefits with the local communities living in and around the Protected Areas or eco-tourism sites where such interventions were attempted to be implemented. Several Protected Areas in India such as Ranthambhore, Kanha and Nagarhole Tiger Reserves provided exemplary evidence of economic growth for the local communities and revenue generation for the government through eco-tourism or biodiversity oriented tourism operations (Karanth *et al*. 2012). Therefore, direct engagement of the local communities for eco-tourism livelihood opportunities might be one of the processes via which to earn more conservation support for the wildlife and natural habitats in wildlife rich areas. Previous studies in western Rajasthan (Mehar, 2011) documented the immense tourism potential for this region. In spite of having quite a harsh climatic system, this region attracts a

relatively large number of tourists every year to enjoy its natural splendours. Repeated observations of abundant and diverse wildlife in some of the pockets across the study area such as the community lands within Guda Closed Area (Oran and Gauchar in Bisalpur, Rudekli and Guda Bishnoiyan), Sathin Closed Area (Burchha and Sargiya khurd), Dhawa Closed Area (Hirno ka tanka community lands) (Figure 1) supported their contingency quite well to be developed as future eco-tourism sites. The current study showed that the population status of the wildlife might still be favourable for nurturing them up to their desired sustainable and viable future. However, without deploying protection-providing administration, safety of these wildlife species cannot be ensured especially when 57.3% individuals reported frequent incidents of illegal hunting activities around their villages. Concurrently, implementation of legally protected land demarcation should be cautiously carried out as 68% of the interviewees had already expressed their negative feelings about the prior legal status of the Closed Areas.

A few of the Closed Areas such as Jamba and Dechu could be conserved for their natural magnificence with their vast stretches of sand dunes. Therefore, different strategies for conservation and eco-tourism approaches should be applied for each of the previous Closed Areas. Consequently, site-specific conservation action plans and sustainable eco-tourism projects should be developed considering the local communities as one of the major stakeholders. This plan should be implemented to conserve the potential habitats and the existing wildlife in these erstwhile Closed Areas under the legal framework of WPA 1972 as future “Conservation Reserves” or Community Reserves” where local communities would be partners with the government agencies. This would ensure the livelihoods for the local communities to maintain their continual support for the biodiversity conservation initiatives in this region.

Conclusion

The natural habitats including biodiversity of the arid region of western Rajasthan, India are under continual threat in the absence of designated protection mechanisms. The State Government of Rajasthan made an attempt to secure the natural resources by declaring the wildlife-rich landscapes as “Closed Areas” during 1980’s to prohibit hunting of wildlife. However, legal modifications during 2002 prohibited hunting of wildlife in all of India. Thus, the management priorities of these erstwhile Closed Areas were gradually disregarded. However, there is still an urgent need to conserve the unprotected landscapes including the biodiversity surviving within them. Eco-tourism based initiatives involving the local communities could be a possible way forward. Eventually, suitable areas might be protected under newly introduced legal frameworks such as “Conservation Reserve” or “Community Reserve” where local communities would be the stakeholders along with the government agencies. In this study, the attitude and perception of the local communities living in and around seven erstwhile Closed Areas of western Rajasthan towards biodiversity conservation was evaluated based on semi-structured questionnaire and interviews. Simultaneously, information on the status of natural habitats and wildlife were collected from various government sources. Majority of the individuals admitted the significant deterioration of natural habitats and wildlife population in the region during the last two decades and a communication gap between them and the government agencies was also identified. Yet, a substantial percent of the population showed their willingness to support eco-tourism and related conservation activities so as to protect the biodiversity of the region. Periodic sharing of dialogues between government authorities and local communities in this region and associating them with the eco-tourism related activities should be prioritised following the successful examples of eco-tourism based conservation projects in other Protected Areas in India.

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