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Zoo from Visitors' Perspective: Exploring the Role of Central Zoo, Nepal in Biodiversity Conservation with Emphasis on Conservation Education

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Abstract

Human induced wildlife loss is driving many species on the brink of extinction and conservation of those species in their native habitat is not sufficient in many cases, which provides the rationale for initiation and execution of ex-situ measures. Zoological gardens (in short zoo), are an important form of ex-situ conservation which can play a diverse role in complementing in-situ measures of conservation, research, conservation financing, captive breeding and conservation education. Among these roles, conservation education is one front where zoos can play a pivotal role which is poorly explored in Nepal. Thus, in this article we have attempted to assess the role of Central Zoo in conservation. For this purpose, the responses of the respondents were collected by using the standard questionnaire. Data were managed in Microsoft Excel and the percentage of the respondents for each response category was calculated. Association between the variables were explored by using Chi-square test. Respondents perceived that the information boards are sufficient but they need to be complemented by dedicated staff for visitors who read and write. Furthermore, respondents perceive that their conservation mindedness such as willingness to volunteer in nature based organisation and activities, willingness to make donations and support the wildlife friendly policies were significantly enhanced after their visit to the zoo. These behaviours were found to be significantly associated with the frequency of the visit as frequent visitors were found to have more positive attitudes towards wildlife and environment. Most of the visitors claimed that they were satisfied with the visit and are willing to visit again. However, they have suggested care on aspects of animal welfare and conservation education. The findings of this study is useful for the zoo management to improve the visitors' experience while visiting their facility.

Keywords: *Conservation, perception, satisfaction, visitors, willingness to pay, Zoological garden*

Introduction

Conservation of the species in their natural habitat is the most desirable option, as the species will evolve with the change in the environment to develop the traits that are suitable for them to survive in their natural habitat (Engels et al., 2008). However, when the population of the species plumps greatly, the in-situ conservation measures are insufficient alone. Ex-situ measures, where the individuals of the species are protected outside their native habitat, than become essential to complement the conservation in native habitat (Engels et al., 2008; Maxted, 2013) as highlighted by Article 9 of Convention on biological diversity (CBD, 1992). Various forms of ex-situ conservation are practised throughout the globe that includes gene bank, seed bank, botanical gardens and zoological gardens, to name some. Zoological gardens and aquariums (Zoo here after) are the place where animals are kept for public display temporarily or on permanent basis.

In the past, zoos used to serve merely as the exhibition centre with entertainment as the sole focus. Even today, the primary motive of the zoo is to serve as an entertainment centre. However, the changing context, where the biodiversity is experiencing the critical threats, demands the transition in the role of those institutions (Sampaio et al., 2020). Nowadays, zoos are considered as one of the leading organisations for the conservation of fauna and their habitat on the full fledge (Conde, 2013; Cuarón, 2005; Fraser & Wharton, 2007). Zoo usually performs three functions: firstly they support

the in-situ conservation initiatives, secondly; they provide support and facilities to generate knowledge for conservation and third they raise public and political awareness about conservation (Tribe & Booth, 2003). Zoo also receives the confiscated and donated animals which can be used to monitor the live trade of the species (Cuarón, 2005). Furthermore, deliberate captive breeding or unintentionally growing population of individuals of animals work as seed for many reintroduction programs throughout the world including Nepal (Aryal & Aryal, 2023; Conde et al., 2011). In brief, zoos are instrumental in providing conservation education, conduct the research on the behavioural and other aspects of species biology, contribute to the conservation of the species in the natural habitat by providing the finance and other support for research and conservation of the species and their habitat (Gross, 2015).

Despite these transitions from exhibition centre to conservation institution, we cannot expect a zoo to be the organisation with full focus on conservation. Studies show that, even today the size and attractiveness outweigh conservation needs and taxonomic uniqueness in selection of the species for their collection indicated by species selection criteria used by the zoos (Frynta et al., 2010). In the meantime, the primary motive of many zoos are cultural and educational meaning they have to select the species that can lure the visitors to the zoo and the impact can spill over to conservation (Frynta et al., 2010). Many zoos are reported to help to raise the awareness in the general public, for example zoo visitors, in comparison to the general public, were found to be more knowledgeable on the aspect of natural history and conservation of lion-tailed macaque (Mallapur et al., 2008). Furthermore, some selected zoos where animals are kept in the human modified landscape that resembles their wild habitat serves as a living natural history museum (Ash, 2018). This exemplifies that the principal role zoos can play in conservation is through their contribution in conservation education.

Nepal has a long history of ex-situ conservation and particularly of the zoo. Central Zoo was established in 1932 by the Late Rana Prime Minister Juddha Samsar Rana and is one of the popular recreation destinations to the visitors visiting the Kathmandu valley (Sharma et al., 2020). Numerous research has been carried out in the central zoo on various topics. For example, the behavioural response of the birds to the visitors (Sharma et al., 2020), physical and psychological wellbeing of animals (Gurung, 2022) animal behaviour (Sharma et al., 2020), animal welfare (Joshi, 2007) and wildlife conservation and management (Prajapati, 2019). However, the role of zoos in conservation particularly on fronts of conservation education and awareness are explored to a limited extent only (Gurung, 2022; Prajapati, 2019). Zoos are thought to play a role in the conservation of the species, however it is hard to select the indicators for the same. However, financial contribution and influence in policy making are two behaviours that can indicate to some extent (Swanagan, 2000).

Thus, we have attempted to explore the role played by the zoo in conservation. The study has dual objectives: exploring the perspectives of people on the aspects of conservation education in the zoo and studying the impacts of zoos on the pro-environmental behaviours of the visitors.

Materials and methods

Study Area

Study was conducted at the Central Zoo Jawalakhel, Lalitpur, Nepal. It has been under the ownership of Nepal Government since 1950 (2007 BS) and has been managed by National Trust for Nature Conservation (NTNC) since 1995. Central Zoo covers the area of nearly six hectares and holds a wide variety of mammals, birds, and reptiles.

Methodology

The study was designed on the exploratory framework and is solely based on the questionnaire survey. For this purpose, a standard questionnaire consisting of three primary sections was prepared. The first section constituted the questions related to the general characteristics of the respondents along with one question to explore the primary motive of the visitors to visit the zoo. Second segment primarily contained the questions related

to the different aspects of conservation education offered by the zoo and the third section consisted of the question related to the influence of the zoo on the perception and motivation of the visitors. Questions related to the suggestion to the zoo for improvement were kept as open ended questions giving the options for the visitors to give more than one suggestion. The questions thus prepared were discussed in the group for any confusion and finalised.

The visit to the zoo was done on September 18, 2022 (Sunday) with the permission from the zoo authority. After visiting the zoo, visitors were approached in the zoo and they were explained about the motive of the visit and we obtained verbal permission to continue the survey. The question was administered in Nepali language and was filled in a questionnaire.

The data thus obtained were entered and managed in the Microsoft Excel Software. Descriptive statistics were carried out and the number of the respondents in each category were calculated. Finally, the Chi-Square test of independence was used to assess the association between the variables. Cramer V was calculated to assess the degree of association between the variables and was performed by using 'rcompanion' package (Mangiafic, 2023) in R Software. All the analyses were conducted by using the R Software (R Core Team, 2021) in the R Studio platform (RStudio Team, 2022). Recommendations given by the respondents were analysed qualitatively and were categorised on the basis of the theme of the respondents and the frequency of each category were calculated and were plotted in bar-diagram using the ggplot2 packages (Wickham, 2016).

Results and Discussion

The age of the respondents ranged from 16 to 47 years (mean = 27.92, Standard deviation =7.14). The fraction of female respondents were slightly higher and more than half had completed secondary level education (Table 1). Most of the respondents were infrequent visitors visiting for recreational purposes (Table 1).

Table 1: General characteristics of the respondents. The values in the parenthesis represents the percentage of the respondents as of total (n=85)

SN	Particulates	Category
1	Gender	Male (45.88%) Female (54.12%)
2	Education	Illiterate (2.35%) Primary Level (5.88%) Secondary Level (50.59%) Higher Education (41.18%)
3	Frequency of Visit	Infrequent (62.35%) Frequent (37.65%)
4	Purpose of Visit	Recreational (85.88%) Educational (11.77%) Photography (1.18%) Volunteering (1.18%)

Perception about zoo

Purpose of establishment: The fraction of people who think the primary motive of establishment of central zoo is for display of animals was higher followed by those who believe the zoo is established for conservation and recreational purposes (Figure 1).

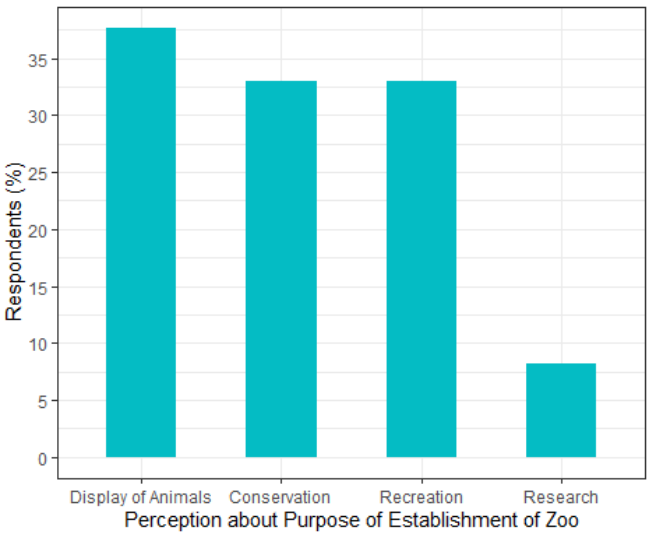

Figure 1: Perception of the respondents about the purpose of establishment of zoo (Multiple answers were given by the respondents in some cases)

Zoo and conservation education: Majority of the respondents agree that there are sufficient information boards for the visitors in the zoo and nearly half of the respondents agree that there are sufficient provisions for conservation education. However, the majority of the visitors perceive that neither the information materials

are sufficiently provided nor the staff in different sections provide required guidance and information. (Table 2). Education level of the respondents and their perception about provision of conservation education in the zoo were significantly associated (χ^2 = 15.566, d.f.= 6, p=0.016, N=85, Carmer's V= 0.303) with the people who have completed primary or secondary level education agreed about the provision more than the other groups. As people with different educational backgrounds, one type of conservation materials visit zoos are not sufficient. Information boards and other informational materials could be useful to those who can read and write. However, for other fractions of respondents, guidance of the staff are essential, which were found to be lacking in the Central zoo. Zoos play a pivotal role in increasing the curiosity in the people and motivate them to visit the natural habitat to gain additional insight in the people (Adetola & Akinboboye, 2020). Through properly designed and marketed campaigns, zoos can help to establish the connection of the zoo visitors with the species and can develop the flagship status of the many species (Skibins & Powell, 2013). Furthermore, raising awareness among the visitors about the threatened status of the species can help to generate the funds for conservation programs in the zoo (Colléony et al., 2017). The influence of zoos in the visitors is not universal with some developing positive attitudes and ultimately developing empathy towards animals that inspires them to work in the conservation sector while the other may develop negative attitudes as well (Bacon et al., 2021). The visitors who are exposed to the conservation education program were found to develop positive attitudes towards the conservation compared to others (Powell & Bullock, 2014). Saying this, many zoos in South Asia still do not have the dedicated conservation education program. Only four out of 300 zoos in India have education staff (Mallapur et al., 2008). Similar is the situation in the central zoo, Jawalakhel. Though the zoo has a dedicated information officer, their interaction with the zoo visitors were found to be limited.

Perception on the impact of Zoo visit on environmental perspectives: Majority of the respondents agree that their motivation to buy environment friendly products increased after visiting zoo (Table 3). Furthermore, the fraction of respondents willing to buy groceries and products that support wildlife conservation are slightly greater than those reporting increased willingness to buy environmentally friendly products even if they have slightly higher prices (Table 3). As this is the stated behaviour of the respondents meaning the fractions of respondents who would actually buy the product might be different. This still indicates the avenue for generating additional funds for zoos by selling the environmentally friendly products within their premises.

The percentage of the respondents willing to volunteer in nature based organisations and volunteer in conservation related activities are identical (Table 3). Volunteering in the nature based organisation represents the relatively long term commitment while volunteering in nature conservation activities represents the short term commitment. Both short term and long term commitment to nature conservation were found to be significantly

Table 2: Perception of the respondents on the different aspect of conservation education in the Central Zoo Jawalakhel

SN	Questions	Fractions of Respondents (%)		
		Yes	Neutral	No
1	Do you agree with the statement '**there are sufficient information boards for visitors within the Zoo**?	**71.77**	12.94	15.29
2	Do you agree with the statement '**visitors are provided with proper guidance and information in the zoo'**?	44.71	10.59	44.71
3	Do you agree with the statement '**staffs in different sections are providing required information for the visitors'**?	24.71	9.41	**65.88**
4	Do you agree with the statement '**there are sufficient provisions to provide conservation education for the visitors'**?	**50.59**	35.29	14.12
5	Do you agree with the statement '**Zoo is providing materials to the visitors to support conservation education'**?	37.65	21.18	**41.18**

Table 3: Perception of the respondent on change in attitude of respondents after visiting central zoo

SN	Questions	Fractions of Respondents (%)		
		Yes	Neutral	No
1	Do you agree with the statement '**your motivation to buy environmentally friendly products increased after visiting the Zoo**'?	61.18	12.84	24.71
2	Do you agree with the statement '**your willingness to volunteer for nature based organisations increased after visiting the Zoo**'?	74.12	11.76	14.12
3	Do you agree with the statement '**your willingness to volunteer in nature conservation activities increased after visiting the Zoo**'?	74.12	9.41	16.47
4	Do you agree with the statement '**Even if you never return, you are going to provide financial support to this zoo**'?	49.41	18.82	31.76
5	Do you agree with the statement '**you are going to provide a donation as much as NRs 5000 (or US $ 50) to protect species you have never heard of** '?	31.77	11.77	56.47
6	Do you agree with the statement '**you are going to endorse public policy that severely restricts future growth and development in order to protect wildlife**'?	60	21.78	18.82
7	Do you agree with the statement '**you are going to buy the groceries and products that support wildlife conservation even when they are more expensive or harder to find**'? (n=84)	69.41	-	20

associated with frequency of visit to zoos of the respondents. Visit frequency was found to be significantly associated with both increased willingness to volunteer in nature conservation organisation ($\chi^2 = 7.606$, d.f.= 2, p=0.022, N=85, Carmer's V= 0.299) and increased willingness to volunteer in environmental conservation activities ($\chi^2 = 22.280$, d.f.= 6, p=0.001, N=85, Carmer's V= 0.349). Frequent visitors were more willing to volunteer than infrequent visitors (Figure 2).

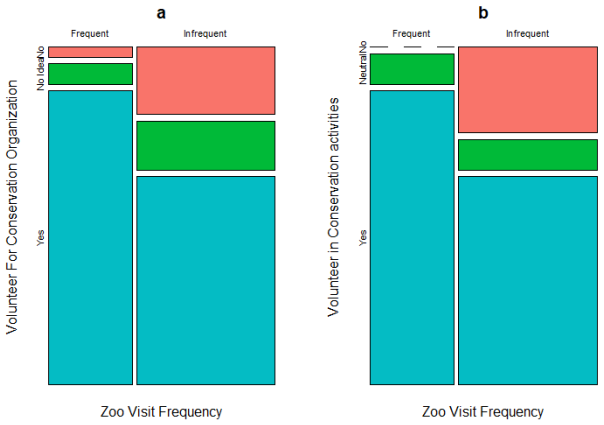

Figure 2: Association of Zoo visit frequency of respondents with their willingness to (a) Volunteer for organization working on front of nature conservation and (b) volunteer in conservation activities

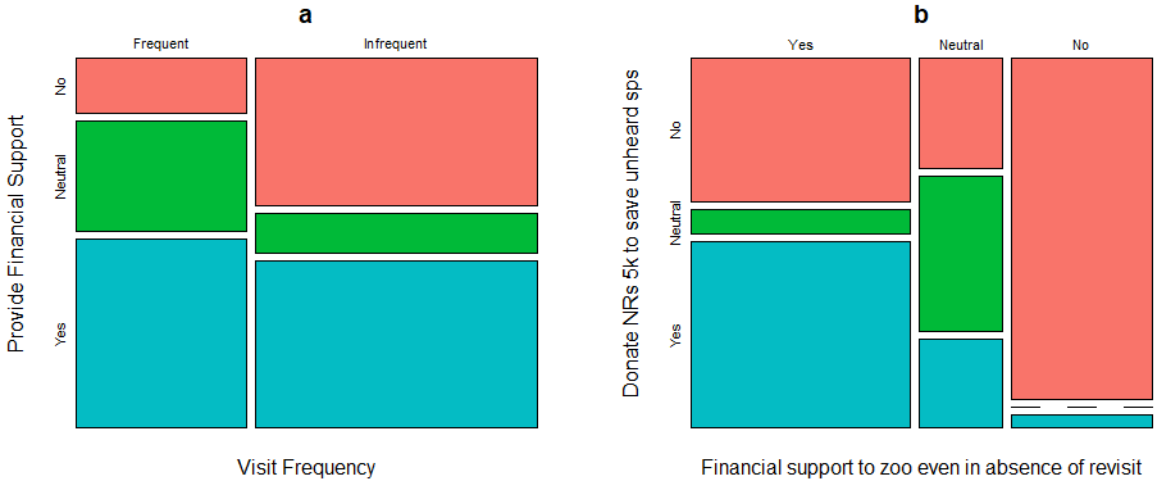

Figure 3: Association between (a) visit frequency and willingness to provide financial support to the zoo and (b) association between the willingness to provide financial support to zoo and provide financial support to the conservation of unheard species

Nearly half of the respondents were looking to provide the financial support even if they do not revisit the zoo again (Table 3). Furthermore, there was significant association (χ^2 = 8.562, d.f.= 2, p=0.014, N=85, Carmer's V= 0.317) between visit frequency and willingness of people to provide financial support to zoos (Figure 3).

The association between the zoo visit frequency and willingness to provide the financial support for the zoo even though they will not visit again were statistically significant (χ^2 = 41.684, df = 4, p-value = 1.939e-08, Cramer's V = 0.317). The fraction of the respondents who are willing to provide the support for the conservation of unheard species is slightly fewer than those willing to provide support to the zoo (Table 3, Figure 3b). Providing adequate knowledge through different forms of conservation education seems inevitable to generate support for the conservation of the species. In the meantime, the willingness of the people to support the zoo and willingness of the people to provide the financial support of Nepali Rupees five thousand (NRs 5000) were also significantly associated (χ^2 = 41.68, df = 4, p<0.05, Cramer's V = 0.495). This indicates that slightly less than 50% of the respondents who are willing to provide financial support to the zoo are willing to contribute to the conservation of unheard species.

The fraction of the respondents who are willing to support the endorsement of wildlife friendly policies that restrict the development of infrastructure in order to protect the wildlife habitat are encouraging (Table 3). Additionally, among the respondents, 92.94% were willing to visit the zoo again while only 5.88% of the respondents were not interested. One respondent remained neutral in this regard.

Altogether 106 suggestions were received from the 82 respondents with some giving more than one suggestion. Improvement of sanitation status for the animals was recommended by the highest number of visitors followed by addition of information, verbal guidance to the visitors, space management and care and treatment (Figure 4). This implies that visitors cared about the animal welfare and conservation education more than other aspects of the zoo.

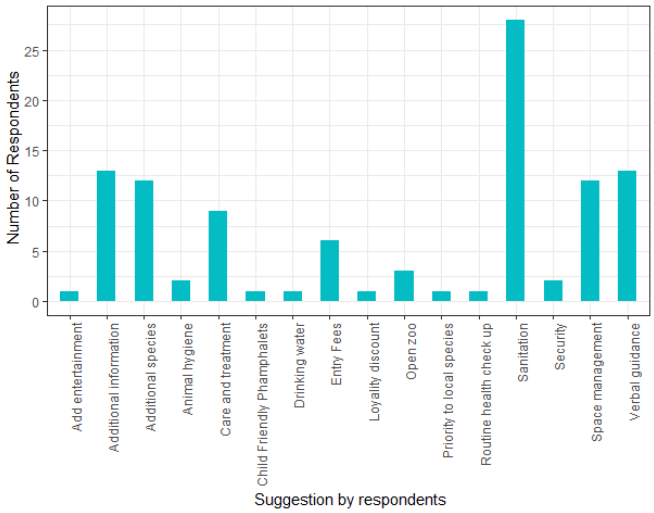

Figure 4: Suggestion for the zoo management given by the visitors, altogether 82 respondents gave 106 different suggestions

The finding of the study represents only the willingness of visitors, not the actual behaviour performances of the visitors. Furthermore, not all species receive equal response from the visitors, and in many cases, the characteristics of the species play an important role in shaping those responses (Powell & Bullock, 2014). Understanding what factor shapes the connection of the visitors to the particular species can be pivotal in designing the conservation education so that the species can be used as flagship species for conservation are vital for the zoo (Skibins et al., 2017) which needs further exploration in case of Nepal.

Conclusion

Globally, both the species and habitat are being threatened by anthropogenic influences and they are not showing signs of slowing down. Meaning, the significance of ex-situ approaches to conservation such as zoos to complement the in-situ measures are increasing. Zoos, though they are gradually making transition from exhibition centres to conservation organisations, are still perceived as entertainment destinations. Zoos have their own limitations, they have to focus on the attractive species so as to lure more visitors to their institution as the visitors are the primary source of finance for the operation of the zoos. Even in such a case, through properly designed and executed conservation campaigns, zoos can be

pivotal in delivering conservation education and generate support for in-situ measures in different forms. Contextual and policy of the individual zoos are pivotal in shaping their contribution to conservation which was not adequately addressed in the case of Nepal. In this article, we have focused on assessing the role of zoos in conservation education and behavioural aspects of visitors through the stated preferences of the respondents. Most of the visitors perceived that the information materials were adequate while the engagement of staff with the visitors and conservation education were not necessarily adequate. Furthermore, willingness to contribute to the conservation of species is higher than the willingness to provide financial support to unknown species – provides additional rationale for dedicated conservation education programs for visitors. Sanitation situation, animal welfare and engagement with the visitors needs improvement in case of central zoo Jawalakhel. Understanding what factor shapes the connection of the visitors to the particular species can be pivotal in designing the conservation education. The information can be used to shape a particular species as a flagship for conservation. This could be a new avenue for further exploration in case of Nepal.

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