CONTRIBUTED PAPER

The influence of perceptions and demographic factors on local support for protected areas

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Abstract

Local support for protected areas (PAs) is necessary for their long-term success and is important for participatory conservation and sustainable management of PAs. However, the support for PAs depends on several factors such as perceived benefits and costs from PAs, and demographic factors. We carried out 845 household surveys in two PAs of Nepal in the Himalayas and in a lowland area (Terai). Overall, local people were supportive of PAs and had high conservation awareness. Decision-tree analyses revealed that perceptions of benefits strongly influenced the support for PAs. Among socio-demographic variables, spatial location, ethnicity, and education status influenced the support for PAs. We recommend focusing on mitigating or reducing costs that arise from the management of PAs while also providing benefits to local people. This should be prioritized for distant communities that provided the least support for PAs.

KEYWORDS
attitude, buffer zone, decision-tree analysis, Himalayas, national park, Nepal, participatory conservation

1 | INTRODUCTION

Protected areas (PAs) are an instrument for biodiversity conservation and maintaining ecosystem processes (Watson et al., 2014). At the same time, they are recognized as contributing to development goals and improved standards of living (Jones et al., 2020; Naughton-Treves et al., 2005). Along with biodiversity conservation, management of protected areas provides benefits to both the global community and local people such as from carbon sequestration, nature-based recreation, wild goods, natural resources, and other forms of livelihood support activities (Allendorf, 2022; Mackenzie, 2012; Ninan & Kontoleon, 2016; Thapa et al., 2022; Tolbert et al., 2019). However, protected area establishment and management also lead to the displacement of people from once inhabited areas along with human-wildlife conflict, prosecution from protected area staff, crop and livestock loss, and restriction on resource use (Acharya et al., 2016; Allendorf, 2022; Bajracharya et al., 2006; Mackenzie & Ahabyona, 2012; McLean & Straede, 2003; West et al., 2006).

Measures of success or failure of conservation initiatives are commonly based on objectively based scientific evidence. In addition to this, the perception of protected areas, including legitimacy and social acceptability of conservation governance, also helps to evaluate the impacts of conservation intervention (Bennett, 2016). Effective management of protected areas and compliance with conservation strategies depend on local support, which can lead to participation and community involvement (Andrade & Rhodes, 2012; Hoffmann, 2022;

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Leverington et al., 2010) in protected area management. Lack of support for protected areas may bring resistance from local people toward conservation, which may be detrimental to protected areas (Holmes, 2007).

The level of support for conservation at the local level may be associated with the perception of ecological effectiveness, good governance and socio-economic impacts of protected areas (Bennett et al., 2019), among other things. When local communities have positive attitudes toward protected areas, it may also relate to the achievement of conservation objectives and protected area success (Bennett, 2016; Struhsaker et al., 2005). Similarly, local opposition and negative attitudes can threaten conservation objectives and be detrimental to achieving protected area management outcomes (Mascia & Pailler, 2011). However, there are critics of the principle of local support for protected areas (Brockington, 2004) who argue that protected areas can be successfully managed even in the absence of local support. This is because the political and administrative power that lies with the protected area authority can often rule over marginalized local people, especially if the conservation policy is backed by international supporters. Brockington (2004) described the conservation success of Mkomazi Game Reserve (Tanzania) despite the resistance of pastoralists and their eviction from the reserve. Another study from a small protected area in the Dominican Republic reported conservation success despite local opposition (Holmes, 2013). This is possibly due to deprivation from development activities in one of the villages, which compelled the villagers to leave their place (Holmes, 2013). In another village, despite local opposition, villagers were unable to challenge the reserve and its policies (Holmes, 2013, p. 78). As people perceive both the benefits and costs from protected areas, this may influence the local support for protected areas. Respondents who hold favorable attitudes toward conservation are more likely to participate in different activities, including conservation, than those who hold less favorable attitudes (Baral & Heinen, 2007).

People may engage in an exchange process if they perceive that benefits surpass costs from the given activity. Social exchange theory (SET) posits that local people are willing to engage in a social exchange or activity if they anticipate benefits without incurring unacceptable costs (Almeida García et al., 2015). SET has been popular in the (social) psychology and sociology literature and is one of the oldest theories of social behavior (Homans, 1958, cited in Nunkoo, 2016). SET is also relevant to protected areas, given that both benefits and costs arise from them. When the exchange of resources between two parties, local people and protected areas in this case, is perceived as balanced and provides higher benefits for local people, the impacts of protected areas are viewed positively. Conversely, when the exchange of resources for local people results in lower benefits, either in a balanced or imbalanced way, then the impacts are viewed negatively (Ap, 1992). This underscores the importance of benefits to outweigh costs to garner support for a given activity. When the perceived benefits outweigh perceived costs, for example from protected areas, then local people are more likely to support protected areas (Han et al., 2023). SET allows differing views of respondents based on experiential results (Prayag et al., 2013) and provides a conceptual base for evaluating impacts, particularly weighing the associated benefits and costs of supporting the given activities (Qin et al., 2021).

Attitudes of local people toward conservation and protected areas can be both positive and negative (Allendorf, 2020). A global review of local people's attitudes toward protected areas revealed that the majority of the respondents had positive attitudes in 84% of the protected areas reviewed (Allendorf, 2020). People form attitudes from their experiences, for example, as a result of interactions with protected areas and cooperation or conflicts with management authorities (Shrestha & Alavalapati, 2006). Local people may have varied perceptions and/or attitudes toward protected areas, protected area policy, and protected area staff (Allendorf, 2010; Karanth & Nepal, 2012). Therefore, even if local people hold favorable attitudes toward protected areas, they may have negative attitudes toward protected area staff (Fiallo & Jacobson, 1995; Karanth & Nepal, 2012; Newmark et al., 1993). For example, in Myanmar, 89% of the respondents were positive toward the presence of protected areas, whereas this was only 53.5% toward protected area staff (Htay et al., 2022).

Local people's positive attitudes toward protected areas depend on the opportunity to receive extractive and other benefits (Allendorf, 2007; Dewu & Røskaft, 2017; Htay et al., 2022). Potential of economic benefits from protected areas may lead to positive attitudes and support for conservation (Arjunan et al., 2006; Wang et al., 2006). While some benefits derived from protected areas, such as carbon sequestration, extend to the international and national levels, costs are often local. Similarly, costs[i] such as crop damage, livestock loss, property damage, restrictions on natural resource use, and human displacement from protected areas bring hardship to local people residing adjacent to protected areas (Bajracharya et al., 2006; Mackenzie, 2012). These costs to local people can lead to negative attitudes toward conservation and protected areas (Htay et al., 2022; Wang et al., 2006).

Attitude is an individual's feelings toward an object and its beliefs, which can also be termed as the view of the world. When an individual encounters any object(s), their reaction to it is determined by their attitude toward

an object(s) (Schiff, 1970, p. 6). Attitude is determined by the beliefs about the attitude object (Fishbein & Ajzen, 1975) and is also an emotional evaluation of that object (Bergman, 1998). In this context, environmental or conservation attitude in the context of protected areas can be defined as an appreciation of particular natural features (Ardoin et al., 2015). On the other hand, to perceive something by a person, s/he must be aware of it (Schiff, 1970). Perception should be limited to those situations in which there is a physical stimulus or a set of stimuli present (Schiff, 1970). The perception of this stimulus may be a function of the value of the given object to an individual (Floyd, 1955 cited in Schiff, 1970, p. 2–3). Perception can be defined as "the way an individual observes, understands, interprets, and evaluates a referent object, action, experience, individual, policy, or outcome" (Bennett, 2016, p. 585).

Nepal currently has 20 protected areas, of which 13 protected areas have buffer zones around them (DNPWC, 2022). Nepal has implemented a participatory approach to protected area management through the buffer zone program (Bhattarai et al., 2017; Paudel et al., 2007). Buffer zones in Nepalese protected areas, which are declared in and around protected areas, allow communities to reside within them and hence include both the natural and built environment. This program aims to increase the potential benefit sharing of protected areas' income with local people. Under the buffer zone program, the government transfers 30–50% of the income from protected areas back to the local community to implement conservation and local development activities. These activities include plantation, community mobilization for patrolling, and reducing human-wildlife conflict. Others include skill development for income generation, empowerment of women, conservation education, and small-scale local infrastructure such as construction of irrigation canals, school support, and improvement of local trails and roads.

The long-term objectives of the buffer zone program are to encourage local participation in biodiversity conservation as well as to support socio-economic development (Paudel et al., 2007). In an earlier study, benefits from conservation were found to be improvements in local infrastructure, health and sanitation, access to forest resources, and skill enhancement. Community participation is important for a variety of reasons including the value it brings to informing, implementing, and managing protected areas' activities. However, local participation in conservation has also been questioned in cases where there is limited opportunity for people to interact with their environment and to influence management (Paudel et al., 2010). This can occur when there is a power imbalance because the decision-making power lies with the protected area authority, which can cultivate feelings of ignorance among local people with respect to their concerns and voices.

In the Nepalese case, studies on the attitude toward and/or perception of protected areas have focused on the individual protected area level and have been confined to a particularly popular protected area (Bajracharya et al., 2006; LeClerq et al., 2019; Nepal & Spiteri, 2011; Shahi et al., 2023). The result obtained from a popular protected areas may not be the true representative of the overall protected area management system when the same policy governs every protected area at the national level. Furthermore, promotion of participatory approaches in protected area management does not guarantee that people will experience or perceive participation as a benefit (Thapa & Diedrich, 2023). Therefore, it is important to understand perceptions of protected areas and the local level of support for protected areas in a diverse way to achieve conservation success.

Although benefits and costs are important variables in determining conservation attitudes, socio-economic and demographic characteristics are also equally important (Bragagnolo et al., 2016; Dewu & Røskaft, 2017; Shrestha & Alavalapati, 2006). Variables such as age (Arjunan et al., 2006; Badola et al., 2021; Gubbi et al., 2008), education (Dewu & Røskaft, 2017; Mehta & Heinen, 2001; Mehta & Kellert, 1998), gender (Arjunan et al., 2006; Badola et al., 2021; Mehta & Heinen, 2001; Mehta & Kellert, 1998), household size (Dewu & Røskaft, 2017; Shrestha & Alavalapati, 2006), income and livelihood support activities (Dewu & Røskaft, 2017; Gubbi et al., 2008; Mehta & Heinen, 2001), and spatial location of villages or settlements (Badola et al., 2021; Bragagnolo et al., 2016; Htay et al., 2022; Sarker & Roskaft, 2011; Shrestha & Alavalapati, 2006) may influence people's attitudes toward protected areas. This study set out to look more specifically at the perceptions among various socio-demographics representing protected areas of different geographical regions with differing socio-demographic features. The aim of this paper was to (1) identify local people's perceptions of protected areas in Nepal, (2) identify the level of support for protected areas, and (3) assess the factors (perceptions as well as socio-demographics) determining support for protected areas.

2 | MATERIALS AND METHODS

2.1 | Study sites

We selected two protected areas: Bardiya National Park (BNP) (Figure 1a) in the southern lowland (hereafter, Terai) and Langtang National Park (LNP) (Figure 1b) in the northern region (hereafter, Himalayas). These two
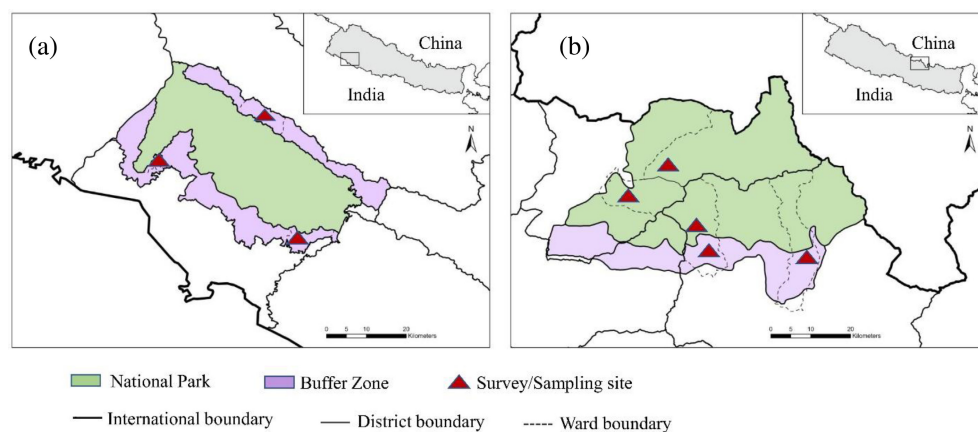
FIGURE 1 Sampling sites in (a) Bardiya National Park and (b) Langtang National Park.

protected areas are representative of the Nepalese protected areas, as most protected areas are distributed in the Himalayan region and Terai. In terms of international tourist visitation, BNP stands out as the second most visited protected area in the Terai region whereas LNP stands out as the third most visited protected area in the Himalayas (DNPWC, 2022). Livelihoods of the local people are focused most on agriculture, livestock husbandry, and tourism.

Bardiya National Park (established 1976) covers 968 km^2 of the core zone with an additional buffer zone of 507 km^2. The buffer zone lies outside of the national park (core zone) boundary around the national park. This park shares a border with Banke National Park in the east and forms a part of the Terai Arc Landscape connecting protected areas of south-western Nepal and northern India. The buffer zone in the northern region of BNP was added in 2011, while the rest of the buffer zone was declared as early as 1996 (DNPWC, 2022). The Bengal Tiger (*Panthera tigris*) is the flagship species of BNP. Other important wildlife species are the Asian Elephant (*Elephas maximus*) and the Greater One-horned rhinoceros (*Rhinoceros unicornis*), among other species. BNP is a Conservation Assured Tiger Standard (CA/TS) registered park and one of the 27 Important Bird Areas (IBAs) of Nepal (BCN, 2020). The total number of households residing in BNP buffer zones is 17,172 (BNP, 2016).

Langtang National Park (established 1976) is the nearest Himalayan national park from the capital city, Kathmandu. The park has an area of 1710 km^2 of core zone with an additional buffer zone of 420 km^2. The buffer zone in LNP lies both outside and inside the national park boundary. The eastern part of the park adjoins Gaurishankar Conservation Area. LNP is an important region of the Sacred Himalaya Landscape connecting protected areas and landscapes of eastern Himalayas of Nepal, Tibet (China), India, and Bhutan. The Snow Leopard (*Panthera uncia*) and Red Panda (*Ailurus*

fulgens) are the flagship species of LNP. The total number of households residing in the buffer zone is 14,963 (LNP, 2019).

2.2 | Data collection

We conducted household-level surveys in three different regions of both national parks. Communities were first clustered into three groups based on their proximity to the national park headquarters: (1) adjacent; (2) mid-distance; and (3) distant. Proximity was based on travel time needed to reach the national park headquarters as well as remoteness rather than linear or geographical distance. In BNP, adjacent areas were defined as being within half an hour by bicycle,[ii] mid-distance was about 4 h of travel by bus/jeep/autorickshaw or motorcycle and distant was at least a day's travel (walk and/or bus/jeep ride). In LNP, this was slightly different due to the fact that the park is located in a remote area. Sites within one-day walking distance or less than a day of travel by bus/jeep ride were defined as adjacent. Sites within 1.5–2 days walk and/or bus/ jeep ride were defined as mid-distance. Those that took 2 days or longer to reach the park headquarters were defined as distant. Although the availability of different travel modes varies greatly and thus affects how far people can travel in a given time. We have considered the actual travel time required to reach the park headquarters, including change of transport and transit times, irrespective of the mode of transport. For instance, traveling a full day by bus means traveling longer distance than walking a full day. This is because not all the regions and sampling sites are connected to roads, and in some regions, walking is the only option.

Then, villages/communities from each cluster were selected representing different districts and local governments. This ensured that survey villages from the three groups did not overlap within the same local government

TABLE 1 Summary characteristics of protected areas and study sample.

Bardiya National Park and buffer zone				
Proximity to PA office	Adjacent	Mid-distance	Distant	Total (n)
Tourism	Present	Absent	Absent	
Topography	Terai (lowland)	Terai (lowland)	Churia hills	
Sample size (n)	167	150	159	476
Langtang National Park and Buffer Zone				
Proximity to PA office	Adjacent	Mid-distance	Far	Total (n)
Tourism	Present	Present (but low)	Absent	
Topography	Himalayas (High mountain)	Himalayas (High mountain)	Himalayas (High mountain)	
Sample size (n)	147	112	110	369

and wards, as the local development status of each local government and/or district also varied. We also considered different levels of tourism while selecting the survey villages from the group (Table 1). This led to a sampling of households in three wards in BNP and four wards in LNP. The household sampling approach within the ward aimed to cover as many diverse respondents as possible by visiting households off the main trail and different parts of villages and surveying at different times of the day.

We applied the sample size calculation formula to calculate the required number of total sample size (Israel, 1992). This gives a total sample size of 99 (10% margin of error) to 391 (5% margin of error) in BNP and 99 (10% margin of error) to 390 (5% margin of error) in LNP. We then applied a quota sampling method to survey the households in each cluster with a minimum sampling quota of 150 households in BNP and 110 households in LNP. In total, we surveyed 476 households in BNP and 369 households in LNP, which is within the statistically acceptable level. We invited the household head or his/her representative older than 18 years to participate in the survey. We aimed to survey equal gender proportions by alternating male and female respondents. This was, however, not possible as not all household heads were in equal proportions of male and female and also due to the absence of target respondents during the household visit. Female respondents were sometimes reluctant to engage in the survey when there were male household members present. Instead, these female respondents preferred and requested that their male household member participate in the survey. We carried out the survey from August to December 2021. The questionnaire included a mix of socio-economic and demographic questions, perceived benefits and costs from the protected area as well as perception statements toward protected area and the level of support for protected areas (Supplementary Information 1). We asked demographic questions and focused on certain variables such as age, gender, education, ethnicity, residency status, and proximity to the protected area head office. These variables are the key characteristics of Nepalese society and also have a direct impact from protected area management. We asked eight perception statements to local people on a Likert scale format (1 = strongly disagree; 5 = strongly agree) (Table 2).

The survey was conducted by the team of Nepalese field assistants in the Nepalese language and took about 0.5–1 h maximum to complete the survey. They were also trained in data collection prior to the field work. The objective of the survey was made clear to the respondents that this work was part of an academic research project. We also clarified that none of the field assistants were national park employees or associated with the national park in any way. This has reduced the possible bias in responding answers. The survey was later translated to English for analysis. Verbal informed consent was obtained from the participants before starting the survey. We obtained human ethics approval (H8229) from James Cook University. Further, we secured research permission from the Department of National Park and Wildlife Conservation as well as BNP and LNP offices.

2.3 | Data analysis

For the demographic comparisons, we categorized caste/ethnicity into three main groups: high caste, indigenous nationalities, and occupational caste. There are several castes in Nepalese Hindu society which fall into four

TABLE 2 Description of variables used in the CHAID decision tree to model the influence of socio-demographic and perception variables.

Variable	Description	Scale
Socio-demographic		
Age	Age in years	Continuous
Gender	Male or female	Binary
Ethnicity	Caste group; whether high caste (e.g., Brahmin, Chhetri, Thakuri), indigenous nationalities, or occupational caste	Nominal
Residency status	Whether the respondent is of local origin or migrated from another district	Binary
Education	Whether the respondent had any formal schooling	Binary
Proximity to the PA office	Location of the respondent village with respect to the protected area office (adjacent, mid-distance or far)	Nominal
Perception		
Benefit	Perception of PA (non-tourism) benefits to respondent household (5-point scale)	Ordinal
	Perception of PA (non-tourism) benefits to community (5-point scale)	Ordinal
Cost	Perception of PA negative impacts to respondent household (5-point scale)	Ordinal
	Perception of PA negative impacts to community (5-point scale)	Ordinal
Conservation effectiveness	Perception of PA management effectiveness in biodiversity conservation (5-point scale)	Ordinal
Conservation importance	Perception of importance to conserve nature and wildlife (5-point scale)	Ordinal
Support for PA	Perception of community support for PA in the village (5-point scale)	Ordinal
	Respondents' stated support for PA in the village (5-point scale)[a]	Ordinal

[a]Dependent variable.

main categories, that is, Brahmin, Chhetri (also called Kshatriyas), Vaishya, and Shudra. These groups of people are found throughout the country. Although the law prohibits categorization of people and discrimination based on the caste system, this is widely practiced throughout Nepal. High caste is labeled as belonging to Brahmin and Chhetri. Similarly, the occupational caste is labeled as belonging to Shudra, which is situated at the bottom of the hierarchy of the Hindu caste system. In addition to this caste, there are also several indigenous and ethnic groups living both in the mountains and the Terai. For example, Tamang and Hyolmo live in the mountains/Himalayas (in our case LNP) and Tharu live in the Terai (in our case southern buffer zone of BNP). High caste is often characterized as being educated and well-off in comparison with other castes. For education level, we categorized people as those who had attended school or did not attend school because there were very high proportions of local people who never attended school. Spearman rank order correlation analysis was performed to explore the relationship between local support for protected areas and perception variables.

We used a Chi-squared Automatic Interaction Detection (CHAID) decision tree to explore the influence of independent variables (socio-demographic and perception variables) on local support for protected areas (Table 2). We chose several socio-demographic variables and perceptions of protected areas in the CHAID model because these variables are most important and widely tested as well as significant in other studies (Bennett et al., 2019; Bragagnolo et al., 2016). We used the decision tree model because it does not rely on assumptions of normality and homogeneity and also is robust in dealing with categorical data (Feldsman, 2002; Önder & Uyar, 2017). CHAID analysis also gives higher classification accuracy than other models (e.g., logistic regression) (Ye et al., 2016). Data were analyzed using IBM SPSS Statistics (version 26).

3 | RESULTS

3.1 | Sample characteristics

There were 845 respondents in total across the two protected areas. The mean age of respondents was 44 years with a slightly higher percentage (51%) in the older age group (≥41 years). Similarly, respondents in BNP were relatively younger than respondents from LNP. The proportion of high caste was less than one-third of the respondents. However, higher caste respondents were equal to other caste groups in BNP but were <3% in LNP (Table 3 and Supplementary Information 2). The majority of the local people had not attended school or had very low levels of education. Only 5% of respondents had a bachelor's degree or above.

TABLE 3 Respondents' demographic characteristics in two protected areas ($n = 845$).

Variable		Percentage
Age	Mean age in years (SD): 43.57 (15.56)	N/A
Gender	Male	54
	Female	46
Ethnicity	High caste	29
	Indigenous (nationalities)	60
	Occupational caste	11
Residency status	Local	69
	Migrant (other regions of Nepal)	31
Education	Did not attend school	52
	Attended school	48
Proximity to PA office	Adjacent	37
	Mid-distance	31
	Distant	32

TABLE 4 Spearman rank order correlation coefficient between the level of support for the protected area and perception variables.

Local support: I support the presence of the national park in our community	rho*
Perception	
The presence of the national park brings (non-tourism) benefits to my household	.429
The presence of the national park brings (non-tourism) benefits to our community	.409
The national park brings negative impacts to my household	−.217
The national park brings negative impacts to our community	−.228
The national park management is effective in biodiversity conservation	.244
It is important to conserve nature and wildlife	.293
The people in my community support the presence of the national park	.615

*$p < .001$.

3.2 | Level of support and perceptions of protected area

Overall, local people were supportive (*I support the presence of a national park in our community*; mean score $3.67 \pm .86$) of the presence of a protected area in their community. We found that only 4% ($n = 34$) responded strongly disagreed to the statement, "I support the presence of a national park in our community," 9% ($n = 77$) disagree and 7% were neutral ($n = 61$). A large number (74%) agreed that they support the presence of the national park ($n = 629$), while 5% strongly agreed to support the national park ($n = 44$).

Among the seven perception statements, the highest mean score was on conservation importance (*importance to conserve nature and wildlife*; 3.96 ± 0.56). This was followed by the perception of *community support to the presence of national park* (3.66 ± 0.78) and the perception of *national park benefits to the community* (3.5 ± 0.91) (Supplementary Information 3). Correlation analysis showed that the level of local support for protected areas and the perception of community support for the national park was strong and positively correlated. Similarly, the level of local support for protected areas was moderate and positively correlated with the perception of national park benefits to the household and community. Local support for the protected area was negatively correlated with the perception of negative impacts (Table 4).

3.3 | Factors influencing support toward the protected area

The decision tree analysis (CHAID method) showed that local support for the presence of a protected area was most strongly influenced by the perception of benefits of the national park to a respondent's household ($\chi^2 = 165.296$, $df = 2$, $p < .001$) (Figure 2). Those who strongly disagreed or were neutral on the perception of benefits from the national park were further split by the perception of negative impacts from the national park to their household ($\chi^2 = 34.048$, $df = 1$, $p < .001$). Those who did not perceive negative impacts from the national park were further split by the perception of benefits of the national park to their community ($\chi^2 = 11.741$, $df = 1$, $p = .002$).

The decision tree (CHAID method) of the influence of socio-demographic variables on local support for the protected area showed that proximity of the household to the protected area office was the strongest predictor ($\chi^2 = 69.226$, $df = 2$, $p < .001$) (Figure 3). Those people living close to the protected area office support the presence of the national park more than their fellow villagers living mid-distance or far away from the protected area office. People living near the protected area office were further split by ethnicity ($\chi^2 = 7.456$, $df = 1$, $p = .044$) suggesting that people belonging to high caste category were less likely to support the presence of the national park than indigenous or occupational caste groups. Those living mid-distance from the protected area office were
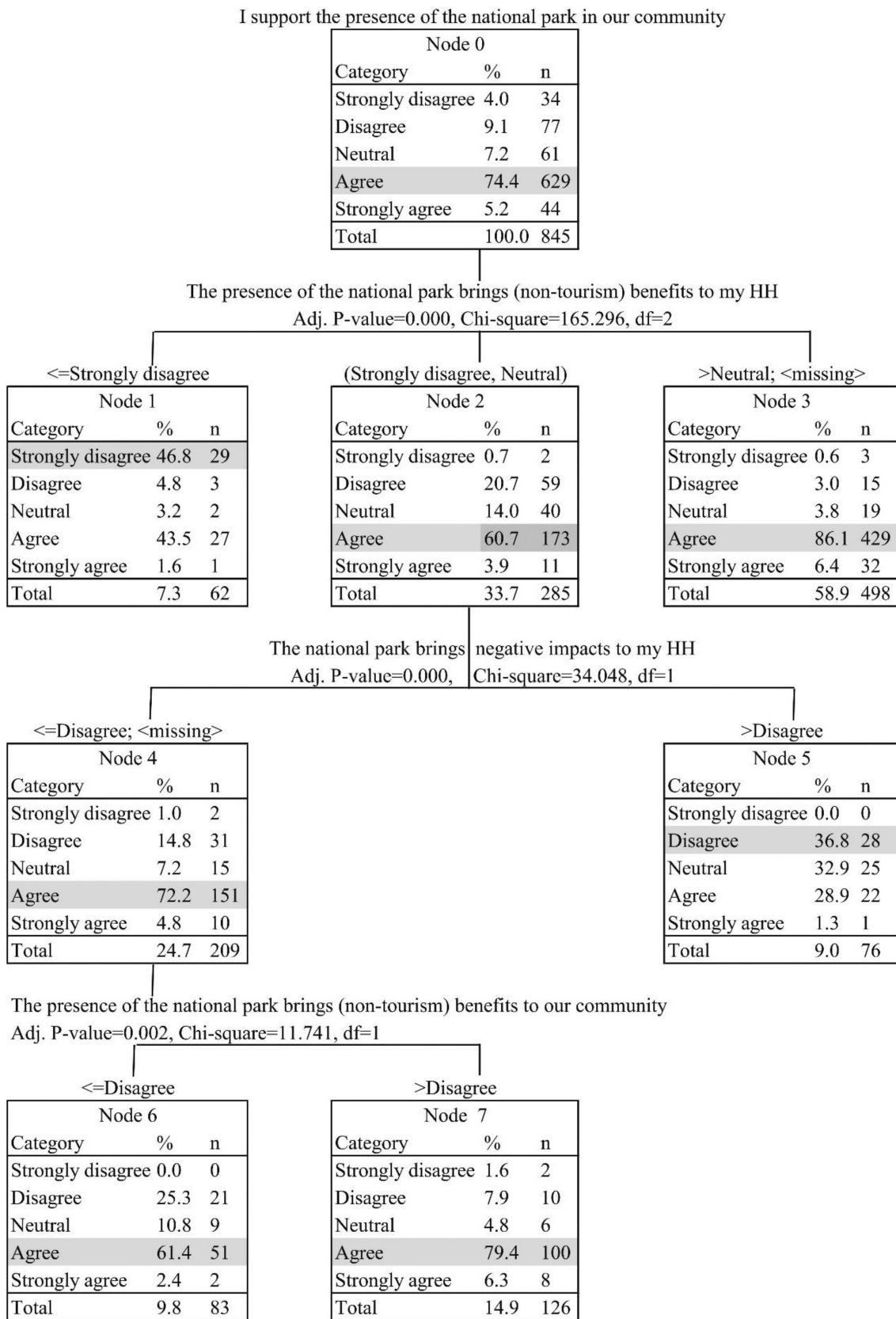
I support the presence of the national park in our community

Node 0		
Category	%	n
Strongly disagree	4.0	34
Disagree	9.1	77
Neutral	7.2	61
Agree	74.4	629
Strongly agree	5.2	44
Total	100.0	845

The presence of the national park brings (non-tourism) benefits to my HH
Adj. P-value=0.000, Chi-square=165.296, df=2

<=Strongly disagree

Node 1		
Category	%	n
Strongly disagree	46.8	29
Disagree	4.8	3
Neutral	3.2	2
Agree	43.5	27
Strongly agree	1.6	1
Total	7.3	62

(Strongly disagree, Neutral)

Node 2		
Category	%	n
Strongly disagree	0.7	2
Disagree	20.7	59
Neutral	14.0	40
Agree	60.7	173
Strongly agree	3.9	11
Total	33.7	285

>Neutral; <missing>

Node 3		
Category	%	n
Strongly disagree	0.6	3
Disagree	3.0	15
Neutral	3.8	19
Agree	86.1	429
Strongly agree	6.4	32
Total	58.9	498

The national park brings negative impacts to my HH
Adj. P-value=0.000, Chi-square=34.048, df=1

<=Disagree; <missing>

Node 4		
Category	%	n
Strongly disagree	1.0	2
Disagree	14.8	31
Neutral	7.2	15
Agree	72.2	151
Strongly agree	4.8	10
Total	24.7	209

>Disagree

Node 5		
Category	%	n
Strongly disagree	0.0	0
Disagree	36.8	28
Neutral	32.9	25
Agree	28.9	22
Strongly agree	1.3	1
Total	9.0	76

The presence of the national park brings (non-tourism) benefits to our community
Adj. P-value=0.002, Chi-square=11.741, df=1

<=Disagree

Node 6		
Category	%	n
Strongly disagree	0.0	0
Disagree	25.3	21
Neutral	10.8	9
Agree	61.4	51
Strongly agree	2.4	2
Total	9.8	83

>Disagree

Node 7		
Category	%	n
Strongly disagree	1.6	2
Disagree	7.9	10
Neutral	4.8	6
Agree	79.4	100
Strongly agree	6.3	8
Total	14.9	126

FIGURE 2 Decision tree (CHAID method) to identify the perception variables influencing the level of support for protected area (Risk 0.246, SE 0.015).
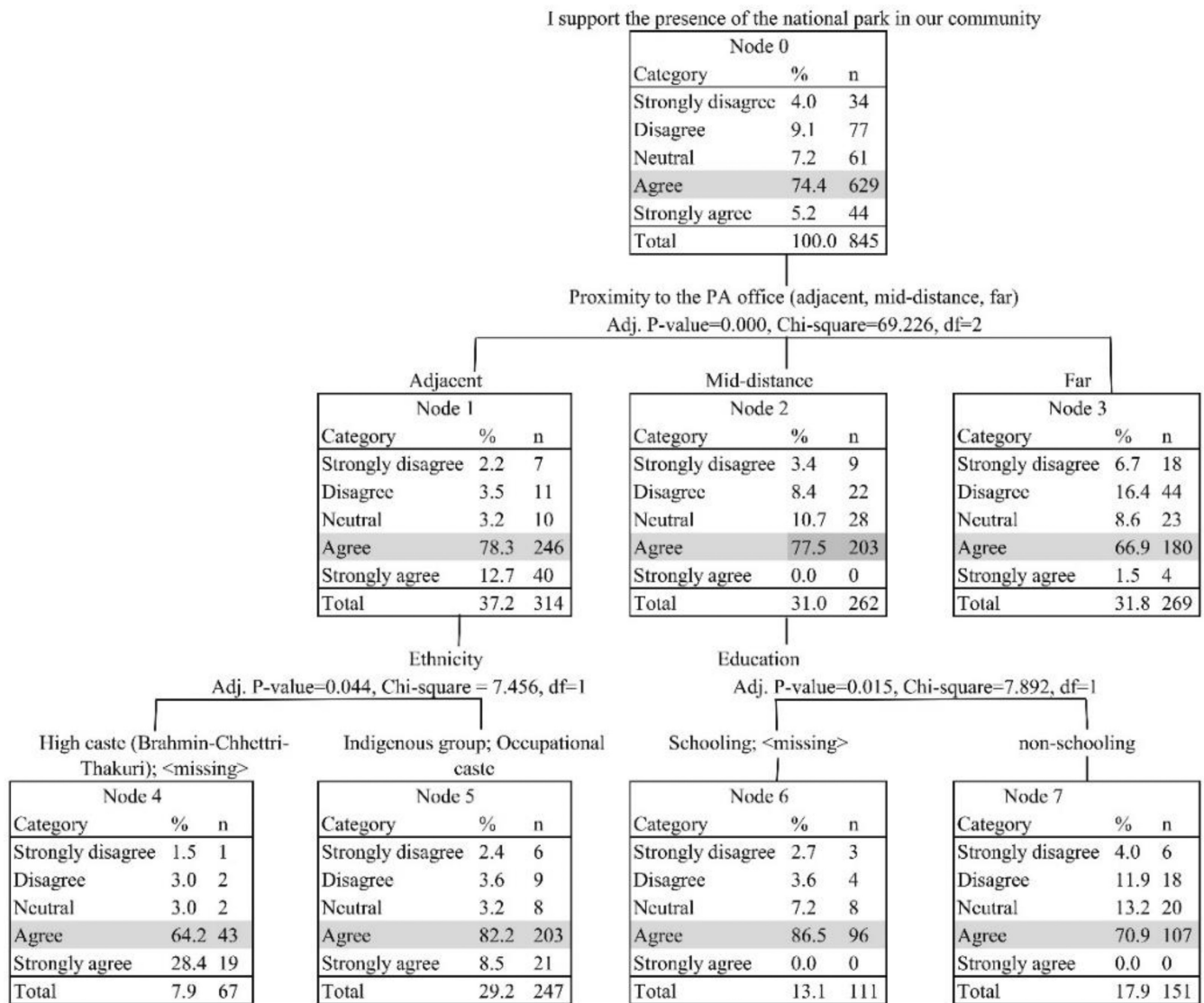
FIGURE 3 Decision tree (CHAID method) to identify the socio-demographic variables influencing the level of support for protected area (Risk 0.256, SE 0.015).

split by education status ($\chi^2 = 7.892$, $df = 1$, $p = .015$) suggesting that people who attended school are more likely to support the national park than people who did not attend school.

4 | DISCUSSION

We evaluated local people's support for, and their perceptions toward, protected areas. Overall, local people were supportive toward the presence of the national park in their community. Regarding perceptions, we found the highest score on the importance of conserving nature and wildlife. This result suggests that local people are generally aware of and supportive of nature conservation. However, correlation analysis showed a weak relationship between conservation awareness and local support for protected areas. On the contrary, perceptions about the national park benefits for households had the lowest score but showed a moderately positive relationship with local support for protected areas. Among the perception variables, local support for protected areas was strongly influenced by the perception of benefits to the household from protected areas. Similarly, regarding socio-demographic variables, the spatial location of households with respect to the protected area head office was the strongest influencer. This means people living near the protected area head office (located within the protected area or protected area buffer zone) tended to support protected areas more than their fellow villagers living far away from the protected area head office.

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Social exchange theory offered a theoretical framework for interpreting the foundations of local support for protected areas. Our study provides evidence to support SET to explain support for protected areas and its association with perceived benefits and/or costs by local people. Critics of SET, however, stress that this theory gives too much emphasis on personal priorities but not enough on collective priorities such as community level benefits and costs (Qin et al., 2021). We addressed this deficiency by asking both the positive and negative perceptions of protected areas at the personal (household) and community levels and linking this to the level of support of local people for protected areas.

Looking at the results across the protected areas at the global scale, the majority of the respondents had positive attitude toward protected areas. These positive relationships between protected areas and people tend to be, however, associated more with larger, less strictly protected, older protected areas and those that are managed at the sub-national level (Allendorf, 2020). Our focal national parks are considered the first generation of formally managed protected areas in Nepal, as they were established within 3 years of the establishment of the first national park. Buffer zones in protected areas are managed through the buffer zone user committees, which also enable them to receive the protected area income to invest back in conservation and local development. While the national park (core zone) is the strict conservation zone, the buffer zone is the resource use zone where both conservation and development are implemented together. In the study protected areas, local people perceived several benefits including extraction benefits (e.g., firewood and timber), community development benefits, economic benefits, and skill development, among others (Thapa & Diedrich, 2023). This could be the obvious reason why the local people were supportive of protected areas. Further, positive attitudes toward protected areas do not mean the absence of negative attitudes among local populations. For example, in Ghana, attitudes of local people toward protected areas were positive overall but still about one quarter of local people also had negative views toward protected areas (Dewu & Røskaft, 2017). As mentioned before, to some extent, these positive attitudes may be linked to the perceived benefits from protected areas (Allendorf, 2022).

When people have positive perceptions of ecological effectiveness, good governance and socio-economic impacts related to protected areas then they also tend to support protected areas (Bennett, 2016; Bennett et al., 2019). However, positive perceptions on the impacts of social conditions and good governance may be more important as these are directly associated with the daily life of local people rather than ecological and/or conservation success of protected areas (Bennett et al., 2019). We found a similar trend as the perception of the effectiveness of protected areas in biodiversity conservation did not influence the local support for protected areas, but the perception of household benefits and costs that arise from protected areas did. Economic benefits, which are often related to tourism, led to favorable attitudes among local people toward conservation in BNP (Shahi et al., 2023) as well as other protected areas of Nepal (Mehta & Heinen, 2001). Conservation activities may be of low priority for local people when they bring negative impacts. Similarly, local people may support conservation when it brings positive impacts. For example, local people prioritized community development and forest protection over wildlife protection in Nepalese protected areas (Mehta & Kellert, 1998). Similarly, attitudes toward forest conservation were more positive than those toward wildlife conservation in Indian protected areas (Arjunan et al., 2006).

When people perceive negative impacts from the reference object, then they may develop negative attitudes (Anthony & Moldovan, 2008; Shahi et al., 2023). One study in Sri Lanka found that when people experienced loss (e.g., livestock depredation) from leopards, then they had more negative attitudes toward leopards (Uduman et al., 2022). Similar to this, our study supports the findings that when protected areas (our reference object) have negative impacts on local people, then they lack support for protected areas and vice versa.

A study of marine protected areas (MPAs) found that support for MPAs was predicted by the perception of ecological benefits and costs. When people perceived benefits, then they tended to support MPAs while the cost perception was negatively associated with the support for MPAs (Hoelting et al., 2013). The level of tourism development, which may also determine benefits to the local community, was also positively associated with conservation awareness and support toward marine ecosystem (e.g., coral reefs) (Diedrich, 2007). These results support our findings as perceived benefits and costs were the strongest predictors of support for protected areas. In Namibia, local support for wildlife conservation was found to decrease when people did not get tangible benefits, such as income from trophy hunting (Angula et al., 2018). Similar to our findings, a study from Ghana also found that households receiving benefits and those encountering fewer problems showed positive attitudes toward protected areas (Dewu & Røskaft, 2017). In the Serengeti ecosystem, local support for the protected area to attain conservation goals was encouraging because of the several benefits people received that are linked to social services, livelihood, and employment. This support, however, reduced to about one-quarter of the

respondents had there been no benefits from the protected area (Kegamba et al., 2023). Similarly, study from European protected areas also showed that the local support for protected areas was strong when people perceived several benefits such as income, recreation, positive effects on quality of life or well-being, and access or use right to natural resources (Cadoret & Jones, 2024; McGinlay et al., 2023).

In the protected areas of Nepal, local people experience several negative impacts such as crop loss, livestock depredation, wildlife attack on humans leading to death, and severe injury, among others (Acharya et al., 2016; Lamichhane et al., 2018; Regmi et al., 2013; Shahi et al., 2023; Thapa & Diedrich, 2023). These impacts bring economic losses to the households that rely on agriculture and livestock for subsistence (Prins et al., 2022; Shahi et al., 2022; Tamang & Baral, 2008). These types of negative impacts can diminish support for protected areas. A wildlife damage compensation policy exists in Nepal for the purpose of addressing economic losses from protected areas and wildlife. However, the compensation paid for the losses is often inadequate, and people experienced administrative hurdles for compensation (Shahi et al., 2022; Thapa, 2016). Although protected areas are established with good motives for biodiversity conservation, they may bring fear to local people. In Thailand, people feared that MPAs may lead to poverty, food insecurity, decreased well-being, and increased conflict. At the same time, they also perceived that MPAs would not negatively impact incomes if the rules and regulations are not enforced (Bennett & Dearden, 2014). However, non-enforcement of protected area rules and regulations may threaten the conservation objectives. This may result in protected areas being turned into paper parks, where the protected areas are legally established but ineffective in achieving conservation objectives (Relano & Pauly, 2023).

Local people's support toward the protected area also depends upon the spatial location of households with respect to the protected area. People living farther from the protected area or from the forest corridor generated positive attitudes (Badola et al., 2021; Shrestha & Alavalapati, 2006), while those situated near the protected area border exhibited negative attitudes toward wildlife and/or protected areas (Ochieng et al., 2021). This could be due to the fact that the farther the villages are from the protected area or forest boundary, the fewer local people receive negative impacts from protected areas or vice versa (Mackenzie, 2012; Prins et al., 2022). Although we did not consider the spatial location of households with respect to the forest boundary of the protected area, local people living close to the protected

area head office were more supportive than those living mid-distance or far away. This may have occurred because the villages that are situated near the protected area office get a higher chance to visit the protected area office and experience direct interaction with protected area staff than villages far away. This may also have provided opportunities for nearby people to receive buffer zone funding for local development activities. Access to the protected area office and interaction with field staff led to higher participation in user groups in other protected areas in Nepal (Agrawal & Gupta, 2005). When interactions only occur with the people living near the protected area office, and others living in distant and remote regions are ignored, this may be counterproductive to the successful conservation of protected areas. This can be because a large section of society is likely to be missed in the mainstream of conservation, and they may lack support for protected areas. For instance, there is a tendency of higher rates of poaching and illegal wildlife hunting in the remote region of Bardiya National Park, one of our study parks (Bhattarai et al., 2016). This may have occurred in the absence of a law enforcement officer and lack of direct interaction with the people when protected area staff are not able to reach distant villages for monitoring and engagement.

Among demographic variables, local people who attended school (among those living mid-distance from the protected area head office) were more likely to support the protected area than people who did not attend school. School attendance and higher level of education may have increased overall awareness of conservation (Arjunan et al., 2006; Dewu & Røskaft, 2017), which is likely to strengthen awareness due to the added conservation education provided by protected area officials. People with lower levels of education were also found to be less likely to support conservation (e.g., Tiger) (Carter et al., 2014). Support for protected areas may be attributed to the benefits protected areas provide for the current and future generations. Other studies have found that resource harvest benefits or income from protected areas influenced people toward a positive attitude toward protected areas (Anthony & Moldovan, 2008; Dewu & Røskaft, 2017; Ochieng et al., 2021). However, benefits from protected areas (such as revenue sharing) do not facilitate the achievement of positive attitudes only, but the lack of transparency and accountability in benefit sharing could also bring negative attitudes (Ochieng et al., 2021). With regards to ethnicity, local people belonging to high caste groups were not likely to support the protected areas than other caste groups (among those living near to the protected area head office). However, contrary to our findings, another study in Nepal's

Chitwan National Park showed that lower caste Hindus were more likely to have negative attitudes toward conservation (Tiger) (Carter et al., 2014). This may happen because the benefits were received by the high caste only from Chitwan National Park. The majority of the respondents in our study belonged to indigenous communities, especially in LNP. The indigenous groups of Tamang and Hyolmo in LNP and Tharus in BNP are also the ones who benefit from the national park, especially from tourism, in addition to other national park-related benefits. This may be the reason why lower numbers of the high caste groups perceived tourism-related benefits than other caste groups. We did not find a correlation with any other demographic feature and support for protected areas.

5 | CONCLUSION

To sum up, overall, local people in BNP and LNP were supportive of the protected areas, which was correlated with the perception of benefits to the household and community. Further, people living close to the protected area head office were also likely to be more supportive than distant villagers. People with schooling backgrounds and indigenous and occupational caste groups exhibited more support than high caste groups. Given the supportive nature of local people toward protected areas, they have the potential to be strong conservation partners. As such, mobilization of local people toward different conservation actions such as monitoring and patrolling illegal activities could fill the gap of inadequate human resources in the field. However, equal attention is needed to address the negative impacts on local people to further strengthen protected area support. This study was based on a perception survey; therefore, even if the local people were supportive toward the protected area, their actual behavior toward the protected area is unknown. Exploration of conservation behavior through participant observation would strengthen the results and demonstrate tangible outcomes of perceived support or lack of support for protected areas. This study provides practical findings on the current status of local support for protected areas in Nepal and may be useful for building positive relationships between local people and protected areas or conservation in the future.

AUTHOR CONTRIBUTIONS
Kamal Thapa: Conceptualization; methodology; data collection; data curation; analysis; writing – original draft; review and editing. **David King**: Writing – review and editing. **Amy Diedrich**: Conceptualization; methodology; supervision; writing – review and editing.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT
Data used in this study will be archived in the institutional repository of James Cook University.

ETHICS STATEMENT
This study obtained human ethics approval (H8229) from James Cook University and research permission from Nepal's Department of National Park and Wildlife Conservation.

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ENDNOTES
[i] Costs and/or burdens in this article have the same meaning and refer to negative impacts to local people due to PAs. However, cost is more often used in economic terms.

[ii] We use bicycle rides instead of walking to compare distance because in the Terai (Nepal's southern flat/low land); bicycles are a common mode of transport to travel short distances.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.