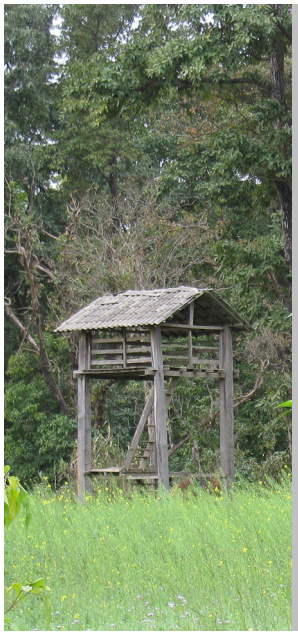

PEOPLE'S PERCEPTIONS OF PROTECTED AREAS ACROSS SPATIAL SCALES

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ABSTRACT

The relationships that local communities have with protected areas are important for the success of these areas. However, it is difficult to capture park–people relationships at spatial scales that make them useful for conservation management and planning. To explore the role of scale in people's perceptions of protected areas, we examined the relative contribution of factors at different levels (i.e. village, protected area, country) to people's attitudes and perceptions of protected areas. Based on 3,573 individual surveys from 140 villages around three protected areas in Nepal and four in Myanmar, we found patterns indicating that people's negative perceptions were influenced by factors at the village and protected area levels. In contrast, positive perceptions, such as an appreciation of conservation and ecosystem service benefits and recreational benefits were influenced by factors at the national level. Our results suggest that a multilevel approach can improve the understanding of park–people relationships and contribute to better planning and management, thereby improving park–people relationships. For example, positive perceptions may be fostered with interventions at the national level, such as national media campaigns or national educational curricula, while negative perceptions may be most effectively mitigated through interventions targeted at specific villages and conflicts.

Key words: Nepal; Myanmar; attitudes; perceptions; multilevel

INTRODUCTION

The relationships between local communities and protected areas are an important aspect of protected area management (West & Brechin, 1991). People's positive attitudes towards protected areas are a key indicator of protected area success (Struhsaker et al., 2005) and people's participation in protected area management predicts greater compliance with protected area policies (Andrade & Rhodes, 2012) and better social and ecological outcomes (Oldekop et al., 2016). Finding ways to improve and strengthen park–people relationships is critical to the long-term success of protected areas.

However, it is difficult to capture park–people relationships across the broad scale necessary for planning and management. Park–people relationships are complex and affected by a variety of factors. Much of our understanding of park–people relationships focuses on individual and household characteristics, such as gender, ethnicity, education, wealth and religion (Bragagnolo et al., 2016). Less often considered are variables at other levels that also affect the park–people relationship. For example, at the village level, spatial and social characteristics can shape the relationship. Proximity to a protected area boundary can increase the amount of wildlife conflict and extractive benefits (Mackenzie, 2012; Sarker & Røskaft, 2011), while proximity to forest outside a protected area, such as community or government forest, can decrease people's dependency on protected areas (Thapa & Hubacek, 2011). In terms of social characteristics, people's participation in social organisations (e.g. number of people who belong to local groups) is correlated with people's willingness to participate in conservation programmes (Dolisca et al., 2009). At the protected area level, levels of enforcement (Struhsaker et al., 2005), people's participation in management (Andrade & Rhodes, 2012) and their trust in management (Stern, 2008) can affect the park–people relationship. At the national level, government policies and people's trust in government may impact how people perceive and

interact with protected areas (Gangaas et al., 2015; Karanth & Nepal, 2012).

Thus, an approach that considers scale and the relative contribution of groups of factors that occur at similar levels to a particular outcome (Guerin et al., 2001) may be helpful in understanding park–people relationships. Multilevel approaches have been used to understand human–environment relationships primarily in two contexts: to explore the extent to which individual-level and national-level influences explain individuals' environmental concern using large cross-national surveys (Marquart-Pyatt, 2012; Pampel, 2014) and the extent to which individual-level and village-level influences explain different aspects of human–environment relationships, such as indigenous land use (Gray et al., 2007), farmer forest conservation behaviour (Dolisca et al., 2009) and people's attitudes towards wolves and leopards (Suryawanshi et al., 2014). A multilevel approach can provide insights into the most appropriate scale for management interventions and help to link the park–people relationship to large-scale conservation planning and prioritisation (Mackenzie et al., 2014; Nagendra et al., 2010). It can indicate whether a coarse- or fine-scale resolution is more appropriate to assess park–people relationships. For example, if people's relationships with protected areas within a country are similar, then a similar approach to the park–people relationship might be appropriate for all protected areas. However, if there is a large amount of variability in people's relationships among protected areas, or among villages surrounding one protected area, then management approaches might be tailored at a finer scale to be effective and efficient.

In this paper, we explore the relative contribution of factors at different scales among seven protected areas in two countries, Nepal and Myanmar. Nepal and Myanmar provide a rich context to explore park–people relationships because human densities are high, livelihoods are primarily subsistence-based and biodiversity is rich. However, they also differ in important ways. Nepal has protected a large percentage of its land (>23 per cent), putting it in the top-20 countries globally and second in Asia for the percentage of its surface area that is protected (Chaudhary et al., 2009). It also has one of the more progressive systems of protected areas and community forestry in the world (Allendorf & Gurung, 2016; Bhattarai et al., 2017; Bhusal, 2014; Heinen & Shrestha, 2006; Ryan, 2015). While Myanmar has maintained large tracts of its natural habitats (Bhagwat et al., 2017), only 6 per cent is within protected areas (Aung, 2007). While these forests are among the last strongholds for large mammals such as tigers and elephants (Connette et al., 2017), because Myanmar has weak forest policies and unstable tenure regimes (Lin, 2004; Woods, 2015), it has one of the highest deforestation rates in the world (FAO, 2014). In contrast to Nepal, Myanmar has taken virtually no steps to integrate communities into conservation strategies,

Table 1. Summary description of protected areas studied in Nepal and Myanmar

	Nepal			Myanmar			
	Kaakri Bihaar	Bardia NP	Lumbini	Alaungdaw Kathapa NP	Chatthin WS	Htamanthi WS	Shwe-U-Daung WS
Size	1.76 km^2	968 km^2	1.2 km^2	1,606 km^2	268 km^2	2,151 km^2	326 km^2
Elevation (m)	650-750	152-1441	161	135-1335	165-260	105-2465	180-1845
Year established	1974	1969 (reserve), 1989 (national park)	1995	1984	1941	1974	1918
Entry	Freely	With permit	Freely	Limited	Limited	Limited	Limited
Extraction	Illegal	Thatch once per year	Thatch once per year	Illegal	Illegal	Illegal	Illegal
Resettlement	No	Some villages	Yes	No	Some villages	No	No
Ethnicity/ religion	Hindu (majority), Tharu, Buddhist	Hindu (majority), Tharu	Muslim (majority), Hindu	Burman	Burman	Shan (majority), Chin, Naga	Burman (majority), Shan

Table 2. Characteristics of survey respondents in Nepal and Myanmar

	Nepal			Myanmar			
	Kaakri Bihaar (n=100)	Royal Bardia NP (n=100)	Lumbini (n=100)	Alaungdaw Kathapa NP (n=1167)	Chatthin WS (n=862)	Htamanthi WS (n=886)	Shwe-U-Daung WS (n=359)
Mean age ±SD (years)	35.2±12.3	32.8±13.6	38.0±14.4	44.8±16.0	43.8±16.2	41.1±14.3	45.3±11.8
Female (%)	47	51	25	37	44	29	20
Education ±SD (years)	2.9±4.2	2.6±4.0	3.5±4.2	3.7±2.7	3.3±2.4	3.9±2.7	4.3±2.5
No education (%)	60	64	54	13	13	7	11
Farmer (%)	55	70	80	86	87	64	85
Land ±SD (hectares)	0.6±1.3	1.1±1.7	1.5±1.7	4.0±4.2	6.3±5.8	2.0±2.1	4.5±4.5
Landless (%)	32	21	12	13	18	36	16

and, due to its historic political isolation, has had virtually no nature-based tourism. Environmental education and conservation and development activities have been scarce around Myanmar's protected areas (Aung, 2007; Rao et al., 2002).

METHODS

Study areas

We analysed data from three protected areas in Nepal (Allendorf, 2007) and four protected areas in Myanmar (Allendorf et al., 2006; Allendorf & Allendorf, 2013) (Tables 1 and 2). In Nepal, we conducted surveys around Kaakri Bihaar, a 'natural park' in western Nepal; Bardia National Park (NP) in southwestern Nepal; and the northern section of the Lumbini Development Project, a wildlife sanctuary (Table 1) in south central Nepal. These three areas, one national park, one local park and one development area that incorporated a conservation area, differ more in management than in human population pressure and have different histories and management strategies, including legal access for local residents. All the areas are surrounded by agricultural land with little to no forest. In terms of enforcement, the year the survey was conducted, Bardia NP was relatively well-protected by the military, Kaakri Bihaar had Forest Department guards who were stationed there but did little to stop illegal extraction of fuelwood and other non-timber forest products, and Lumbini was a newly-established area with no official system of protection. In terms of extraction, people were allowed to legally extract thatch once per year for a small fee from Bardia NP while no legal extraction was allowed from either Kaakri Bihaar or Lumbini, although informal extraction from both areas was common.

In Myanmar, we conducted surveys around four protected areas in northern Myanmar: Alaungdaw Kathapa National Park, Chatthin Wildlife Sanctuary (WS), Htamanthi WS and Shwe-U-Daung WS (Table 1). These protected areas represent a range of human population pressure, from relatively low in Htamanthi WS, which is surrounded by extensive intact forest, to high in Chatthin WS and Shwe-U-Daung WS, which are surrounded by agricultural land and severely degraded forest. Alaungdaw Kathapa NP is intermediate in population pressure and surrounded by a mix of agricultural fields and relatively intact forests. Regulations do not officially allow any extraction from these protected areas.

In terms of policy and management changes in the last 20 years since these surveys were conducted, less has changed than might be expected. Nepal remains progressive, with new policies enacted in the 1990s to distribute revenue streams to communities in protected area buffer zones. In Myanmar, although the context is changing rapidly with the advent of democracy, protected area policies have not changed significantly. While we might expect the perception of benefits to have increased and the perception of problems to have decreased in Nepal based on an additional two decades of investment in buffer zone communities (although due to the success of conservation, wildlife conflict is

increasing in some areas), we would not expect perceptions in Myanmar to have changed much yet since policies have not yet changed and management plans for protected areas are just now being written.

Data

We conducted standardised open-ended surveys (Patton, 1990) to determine people's attitudes towards and perceptions of each of the seven protected areas. In Myanmar, the first author trained local schoolteachers to conduct the interviews in each protected area. The teachers conducted 1,167 interviews in 41 villages at Alaungdaw Kathapa NP, 862 interviews in 28 villages at Chatthin WS, 886 interviews in 28 villages at Htamanthi WS, and 359 in 17 villages in Shwe-U-Daung WS. We randomly selected 30 households in each village from ledgers maintained by village chairmen. In villages with fewer than 30 households, we interviewed someone in each household. To assure representation of the perspectives of different residents, we developed a sampling scheme that included age, gender and household position. At the first house in a village the husband was interviewed, the wife at the second, the grandfather at the third, the grandmother at the fourth, the eldest child 18 years or older at the fifth, and the youngest child 18 years or older at the sixth. If the appropriate person was not available, we proceeded through the sequence. The refusal rate was extremely low, only a handful in each area, usually because a person did not have the time to participate.

In Nepal, the first author conducted one hundred surveys in villages adjacent to each of the three protected areas. Because Kaakri Bihaar and Lumbini are relatively small, interviews were conducted in each of the adjacent villages. In Bardia NP, villages were chosen based on their contrasting locations, including distance to the nearest government forest and accessibility to park headquarters. Participants were chosen based on the order in which they were met as the first author

Buffer zone of Bardia National Park, Nepal © Teri Allendorf

walked through the village visiting each house in turn. People were interviewed outside their homes or in adjacent fields. Only one adult in a household was interviewed.

Attitude is defined as a human psychological tendency that is expressed by evaluating a particular entity, called an attitude object, with some degree of favour or disfavour (Ajzen & Fishbein, 1980). Perceptions, or beliefs, are the associations that people establish between the attitude object and the characteristics they attribute to the object that inform their attitude (Ajzen & Fishbein, 1980). For example, in the phrase, "the national park is beautiful", national park is the attitude object and beautiful is an attribute associated with the object.

In the survey, we determined perceptions by asking respondents "Does the area provide benefits?", and, if yes, "What are they?" and "Does the area cause problems?", and, if yes, "What are they?" We determined attitude by asking the respondents "Do you like or dislike the area?" Additional perceptions of benefits and problems were generated by asking respondents "why" they either liked or disliked the protected area. We pooled the "did not like" and "don't know" responses into one category because neither response demonstrates a positive attitude.

We grouped verbatim responses to the questions about benefits and problems and reasons for liking and disliking the protected areas into inductively-created categories (Miles & Huberman, 1994; Patton, 1990). The negative perception categories were: 1) prohibition of resource extraction, such as fuelwood, fodder and non-timber forest products; 2) conflicts with protected area management, such as fines imposed for illegal entry and extraction or cropland reclaimed by protected area management; 3) crop damage or danger to humans by wildlife; and 4) problems with mining in the protected area (only mentioned in Shwe-U-Daung WS). The positive perception categories were: 1) conservation, including protection of wildlife species, forest, and ecosystem services; 2) availability of resources for extraction, such as fuelwood and fodder; 3) recreation and aesthetic, such as taking walks or enjoying the greenness; 4) protected area management activities, such as development and road-building. Dichotomous variables were created for each category. Each respondent was given a one if they gave a response that fell within the respective category and a zero if they did not. For example, a respondent who said that the area allowed them to collect fuelwood was given a one for extraction benefits.

The Nepal data were collected in the mid-1990s and the Myanmar data were collected between 1999 and 2004. While people's perceptions may have changed over time in these protected areas, the dataset provides a unique opportunity to compare multiple protected areas, allowing the exploration of issues of scale. More detailed descriptions of the data collection and perception categories for each country can be found in Allendorf et al. (2006) and Allendorf (2007). Because of the age of the data, it is important to note that we are not trying to describe the current state of park–people relationships in these protected areas, but are instead using a unique dataset that allows us to investigate a novel way to describe and understand people's perceptions of protected areas.

Entrance to Bardia National Park © Teri Allendorf

Analysis

The levels of geographic scale that we examined were village, protected area and country. We identified at which level there was the largest amount of variability for attitude and each perception category. We calculated one variable for each level to compare variability: village proportion, protected area mean proportion, and country mean proportion. Village proportion is the proportion of respondents in each village who liked the protected area (for attitude) or who mentioned a particular category of benefit or problem (for perceptions). For the protected area mean proportion, we averaged all the village proportions for a given protected area. For the country mean proportion, we averaged all the protected area proportions within a country. We then visually compared the variability at each level by looking at the spread of village proportions both within and among protected areas. To supplement the visual comparison, we compared the range of village means, the interquartile range of village means, the range of protected area means and the range of country means (i.e. the difference between the two country means). The interquartile range is the distance encompassing the middle 50 per cent of the data between the 75th and 25th percentiles. We use the interquartile range to reduce the effect of outliers.

RESULTS

The patterns in the proportions of people who liked the protected areas (i.e. their attitude) and their perceptions of problems and benefits suggest some perceptions were influenced more by factors at finer scales while other perceptions were influenced more by factors at larger scales. The wide range of village means within the protected areas for attitude and the perception of extraction problems, compared to the range among the protected areas and between the two countries, indicates that village-level factors were important in influencing them (Figures 1a and 1b, Table 3).

In contrast, wildlife problems (Figure 1c) and management problems (Figure 1f) show a pattern indicating that factors at the village and protected area levels were important. For example, in three protected areas (Alaungdaw Kathapa NP, Htamanthi WS, Shwe-U-Daung WS) people perceived few to no conflicts with wildlife while in the remaining protected areas people perceived higher levels of wildlife conflict (Figure 1c, Table 3). This pattern indicates that factors at the protected area level were important. However, the scattered distribution of the village means within the protected areas that had wildlife conflict indicates that village factors were also important.

People's perceptions of management problems showed a similar pattern to perceptions of wildlife problems. Fewer than 10 per cent of respondents perceived problems with management in two areas in Myanmar and two areas in Nepal, while more than 25 per cent of respondents perceived problems with management in the remaining areas (Figure 1f). However, some of the

Table 3. Interquartile range and range (in parentheses) for village means within each protected area (rows 2-8), protected area means within each country (rows 9 and 10), and ranges for country means (the difference between the two means) (row 11). Country mean range is not given for mining problems because only one protected area mentioned mining problems. Interquartile ranges for countries are not applicable because only two countries were under consideration

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Landless (%)	32	21	12	13	18	36	16

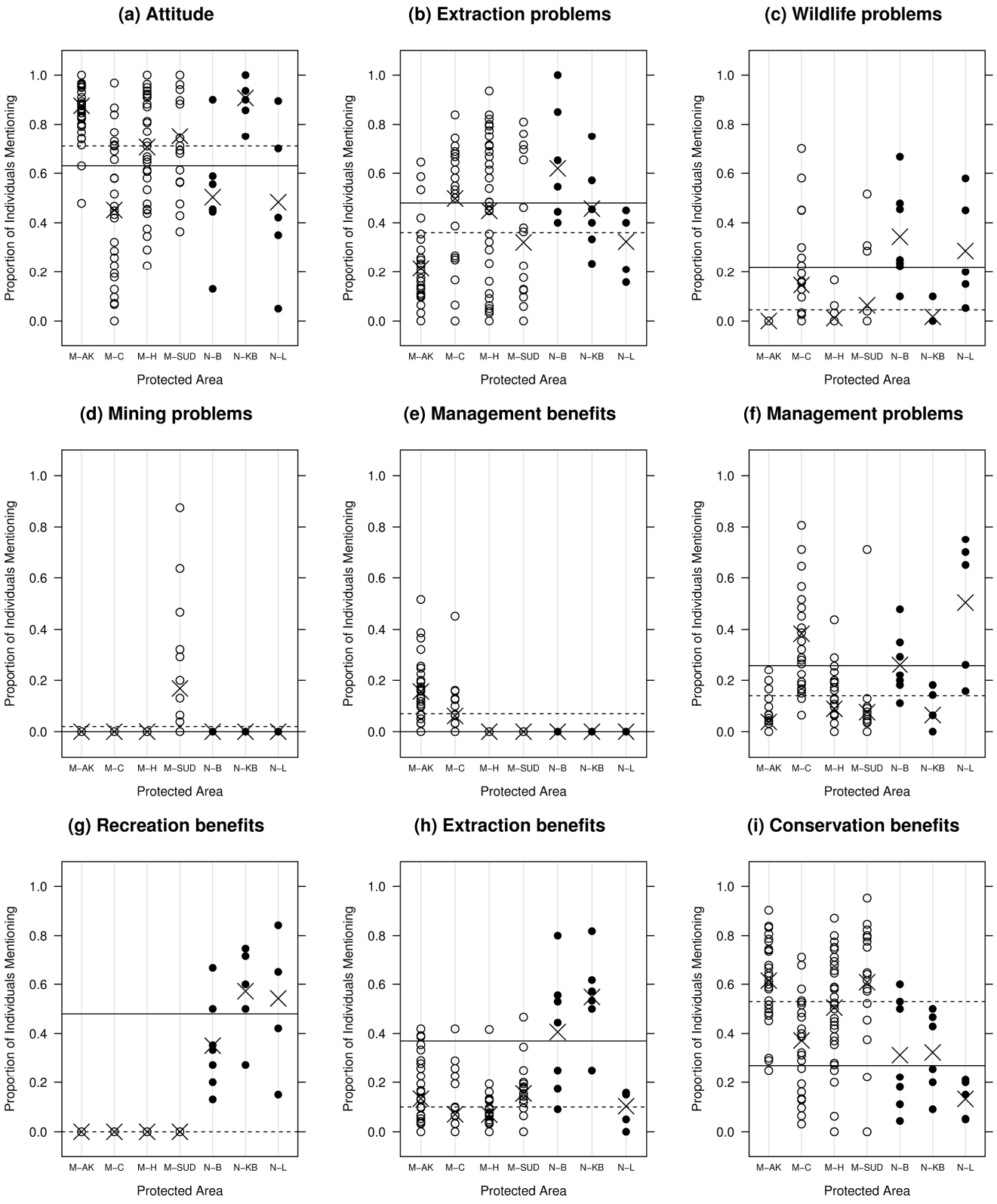

Figure 1. Variability in attitude and perceptions at village, protected area, and country scale. Open circles (○) are Myanmar village proportions; closed circles (●) are Nepal village proportions; X's are protected area mean proportions; dashed lines (--) are country mean proportions in Myanmar; solid lines (–) are country mean proportions in Nepal; M = Myanmar protected area (e.g., M-AK is Alaungdaw Kathapa National Park in Myanmar); N = Nepal protected area (e.g. N-B is Bardia National Park in Nepal)

protected areas also had large variability among villages. For example, in Lumbini, the majority of people perceived problems in all but two villages, where very few people perceived problems. Chatthin WS also showed large variation among villages.

Some perceptions occurred in some protected areas and not others, indicating a protected area effect. For example, people perceived mining problems only in one protected area, Shwe-U-Daung WS (Figure 1d) and management benefits only in two protected areas (Figure 2e), Alaungdaw Kathapa NP and Chatthin WS, indicating that these perceptions were influenced by factors that only occurred in those areas. In terms of mining problems, local businessmen had encouraged people to move into the area around Shwe-U-Daung WS to do small-scale illegal gold-mining inside the sanctuary (Figure 1d). It should be noted that while these factors only occurred in some protected areas, there was a still a village effect, as demonstrated by the wide distribution of means among the villages.

Finally, three of the four positive perceptions show a pattern indicating that factors at the country level were influencing people's perceptions of the protected areas. Only people in Nepal perceived recreation benefits, which indicates that factors at the country scale were driving this perception (Figure 1g, Table 3). Two other positive perceptions, conservation benefits and extraction benefits, were perceived in both countries, but the relatively large difference in the means between the countries indicated that factors at the country level played a role in driving these perceptions (Table 1). Interestingly, the distributions of the two perceptions are mirror images of each other (Figures 1h and 1i), with more people in Nepal perceiving extraction as a benefit and more people in Myanmar perceiving conservation as a benefit. This pattern and large difference in the means indicates that, in addition to protected area factors, factors at the country level were playing a role in people's perceptions of these benefits.

The perception of wildlife problems is an example that demonstrates why we chose not to explicitly estimate the amount of variability at each level. As our results show, the data for wildlife problems is not normally distributed, contains outliers, and cannot be naturally transformed. The variances within spatial levels vary wildly. For example, some protected areas show a range of barely 0.2 across villages, whereas other protected areas have values spread almost over the entire interval from 0.1 to 1.0. We believe these differences in variances have meaningful implications and should not be ignored. In the particular case of problems with wildlife, the variance may be small for a particular protected area because the protected area does not have the type of wildlife that causes conflict or only has small numbers of them, whereas the variance could be large in another area, indicating either a non-uniform distribution of wildlife for that area or some other factor that is driving the perception of wildlife problems.

DISCUSSION

Our results indicate that a multilevel approach to park–people relationships can provide novel insights by identifying the levels at which factors are driving different aspects of the relationship. At these study sites, people's negative perceptions were more influenced by factors at the protected area and village levels, while positive perceptions, such as an appreciation of conservation and ecosystem service benefits and recreational benefits, were more influenced by factors at the national level. In this discussion, we focus primarily on interpreting results in a way that highlights these more generalisable patterns in perceptions. Although the data, because of its age, does not reflect the current situation in each country, the broader patterns in perceptions reveal how the consideration of scale can contribute to understanding park–people relationships in a novel way.

Because attitudes can be thought of as a subjective summation that people make of the positive and negative attributes of an object (Ajzen, 2001), we posit that the relatively high number of people who liked the protected areas is driven by a foundation of positive values towards protected areas and the environment, as reflected in perceptions of benefits. However, people weigh these benefits against the specific problems that they face within the particular context of their household and village, particularly in terms of extraction and wildlife problems, causing wide variation among the means for villages in each protected area.

The high variability among villages in people's perceptions of extraction as a problem may be explained by their access to resources inside and outside the protected areas. Patterns of resource extraction can differ widely from village to village depending on villages' proximity to community and government forest relative to protected areas (Thapa & Hubacek, 2011).

A perception of wildlife problems is influenced by factors at the protected area level because people will only perceive wildlife as a problem if the protected area has wildlife species that cause problems. However, among villages within a protected area, large variability in people's perceptions of wildlife conflicts exists

Chatthin Wildlife Sanctuary, Nepal © Teri Allendorf

because the distribution of wildlife is often highly spatially variable within a protected area (Nagendra et al., 2010). The three protected areas with the lowest levels of wildlife problems were Kaakri Bihaar, which is small with no large resident wildlife, and Alaungdaw Kathapa NP and Htamanthi WS, which harbour wildlife such as elephants that eat crops, but which also have intact surrounding forest that may provide a buffer for wildlife. In Chatthin WS, there are many Eld's deer (*Rucervus eldii*), the sanctuary's primary species of conservation concern, and their suitable habitat is concentrated in the south of the sanctuary, which is where villages are most impacted by deer eating crops (Allendorf et al., 2012). Around Shwe-U-Daung WS, herds of wild elephant roam mainly in the area southwest of the sanctuary. While Lumbini contains nilgai (*Boselaphus tragocamelus*) that eat crops.

In terms of people perceiving problems and benefits from management, it was not surprising that people's perceptions were influenced at the protected area level. A single policy strategy is usually applied relatively evenly across a protected area (Mackenzie et al., 2014) because protected areas are usually treated as one spatially homogenous unit (Nagendra et al., 2010). For each protected area in this study, the villages surrounding it are subject to the same policies. People's perceptions of problems with management primarily occurred in Chatthin WS in Myanmar, and Bardia NP in Nepal, which have the highest density of guards, indicating a relatively high enforcement level of protected area rules and regulations. In Chatthin WS and Alaungdaw Kathapa NP, people also perceived management benefits. However, unlike Chatthin WS, very few people in Alaungdaw Kathapa NP perceived that they also had problems with management. A famous religious site is located inside Alaungdaw Kathapa NP, which thousands of people visit annually on pilgrimage. The warden and staff are responsible for managing this religious site and this may account for

people's perceptions of management benefits, which included tourism facilities and the maintenance of roads. People may also be less likely to have conflicts with management of Alaungdaw Kathapa NP, because it has a more extensive, forested buffer area that provides people with natural resources on which they depend and decreases their need to illegally extract from the national park. Less extraction from the park decreases the chances they will have negative interactions with park staff. Chatthin WS, on the other hand, is an isolated forested area surrounded by agricultural fields, which means that people depend on the sanctuary for natural resources and are more likely to have negative interactions with staff.

However, while management problems differed at the protected area level, with respondents in four of the seven protected areas perceiving few management problems, the large variability among villages indicated that village-level dynamics also affected people's relationship with protected area management. This may be because village distance from headquarters and the protected area boundary can affect how often residents interact with protected area staff and patrol units, in both positive (e.g. access to information and personal relationships, Allendorf et al., 2012) and negative ways (e.g. the likelihood of getting caught illegally extracting, Weladji et al., 2003).

At the national level, people in Nepal may perceive recreational benefits more because they have a culture of going to the forest or a natural spot for picnics with family and friends, similar to other South Asian countries (Robinson, 1972). Their appreciation of the beauty of the forest, the cool breezes and the shade of trees may have been strengthened by the influence of both the government and civil sector, including the media and tourism sector, which have all contributed to a legacy of supporting protected areas and highlighting the important role they play in Nepal's heritage and economy.

The greater appreciation for extraction benefits in Nepal may be influenced by its higher human population densities, which means that more people rely on each unit of protected area for their resources such as fuelwood and fodder. This dependency, in turn, may cause them to be more appreciative of the extractive benefits because they have no alternative other than to extract illegally from protected areas. Two of the Nepalese protected areas in our study were located in the terai, the southern flatlands, and one is located in the hills, in a type of valley called the 'inner' terai. These areas are surrounded by some of the densest human populations in the world (330 people/ km^2), and have relatively little forest outside of the protected areas (Stræde & Treue, 2006; Thapa & Hubacek, 2011). In contrast, two of the areas in Myanmar, Alaungdaw Kathapa NP and Htamanthi WS, have fairly extensive forest outside their boundaries. Protected areas in the northern part of Nepal may show a pattern more similar to Myanmar as they are not as isolated from other forest or as densely populated.

While people's perceptions of conservation and ecosystem service benefits may vary between the countries because people in Myanmar actually are more likely to value conservation and ecosystem services than people in Nepal, this finding may also be explained by methodological issues. Usually people will only give a certain number of responses to open-ended questions and not an exhaustive list (Ajzen, 2001). Thus, the fact that people in Nepal see more types of benefits than people in Myanmar might make them less likely to mention any particular benefit.

Management implications

Our results highlight the potential to manage park–people relationships not only at the protected area level, but across larger and smaller levels. Protected areas are often treated as spatially homogenous, without taking into account dynamics at the village level within a protected area (Nagendra et al., 2010) or at the national level across protected areas. Our results suggest that some perceptions are driven more by factors at the national level, and this means that those perceptions could be influenced by interventions at the national scale such as national media campaigns and educational curricula. However, perceptions driven at finer scales would be more efficiently and effectively addressed with appropriate interventions at those finer scales, rather than blanketing entire protected areas or focusing only on areas closest to headquarters, which often occurs (Ericsson et al., 2006; Mackenzie et al., 2014; Nagendra et al., 2010). For example, community forestry and subsidies for energy substitutes, such as solar or biogas, could be prioritised in villages that depend the most on the protected area for extraction and have the fewest alternatives. Mitigation and compensation for wildlife conflicts should be prioritised in villages with the most conflict (Mackenzie, 2012).

Our results also have implications for how to capture park–people relationships across broad scales. One of the difficulties in incorporating park–people relationships into broader scales of management and planning is that sampling can be prohibitive at larger scales. However, sampling could focus on the scale at which the phenomenon occurs. Perceptions that are

driven at larger scales could be identified and quantified with less sampling while perceptions driven by finer-scale dynamics would require more sampling at finer scales (Ericsson et al., 2006). In the context of this study, for example, our results suggest that when investigating benefits, it would be most efficient to sample many protected areas but relatively few villages around each protected area. In contrast, when investigating problems, it would be necessary to sample more villages around each protected area because of the higher heterogeneity among villages. However, because of the nature of problems, which are primarily related to extraction and wildlife conflicts, it may be possible to reduce the amount of sampling necessary to capture negative perceptions by targeting areas where problems are known to be more severe based on expert knowledge or records of illegal activities.

Our finding that people perceived more problems than benefits with management is in line with other studies that found people's attitudes towards protected areas are often generally positive while their attitudes towards the management of protected areas are often negative (Bauer, 2003; Gillingham & Lee, 1999; Picard, 2003). If explicit strategies were developed by protected area management to articulate and promote the benefits of protected areas they could increase people's perceptions of benefits from the protected area and from management. This strategy was successfully implemented in Chatthin WS based on the results of this survey and the staff were able to significantly improve people's attitudes towards management and the sanctuary (Allendorf et al., 2012).

Finally, the pattern of benefits at larger scales and costs at finer scales that we found both in Nepal and Myanmar has interesting parallels to the idea that protected areas provide global benefits while costs are disproportionally borne by residents around protected areas (Balmford & Whitten, 2003). Our results support the idea that benefits of protected areas are realised at broader scales and costs at finer scales. However, in contrast to the usual interpretation that benefits are only realised by people not living near protected areas, we find that local residents living adjacent to protected areas are aware of and appreciate many diverse benefits from protected areas. This result complements research on ecosystem services that captures and highlights these types of benefits for local communities in terms of poverty alleviation (Andam et al., 2010; Naughton-Treves et al., 2011; Turner et al., 2012).

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RESUMEN

Las relaciones que las comunidades locales tienen con las áreas protegidas son importantes para el éxito de estas áreas. Sin embargo, es difícil capturar las relaciones entre los parques y las personas a una escala espacial que les permita contribuir de forma útil a la gestión y planificación de la conservación. Para explorar el papel de la escala en las percepciones de las personas sobre las áreas protegidas, examinamos la contribución relativa de los factores en diferentes niveles (aldea, área protegida, país) a las actitudes y percepciones de las personas con relación a las áreas protegidas. Sobre la base de 3573 encuestas individuales en 140 aldeas alrededor de tres áreas protegidas en Nepal y cuatro en Myanmar, encontramos pautas que indican que las percepciones negativas de las personas se vieron influenciadas por factores a nivel de aldea y área protegida. En contraste, las percepciones positivas, tales como la valoración de los beneficios de la conservación de la biodiversidad y los servicios ecosistémicos y los beneficios recreativos, fueron influenciados por factores a nivel nacional. Nuestros resultados sugieren que un enfoque de múltiples niveles puede mejorar la comprensión de las relaciones entre los parques y las personas y contribuir a una mejor planificación y gestión, mejorando así las relaciones entre los parques y las personas. Por ejemplo, las percepciones positivas pueden fomentarse mediante intervenciones a nivel nacional, tales como las campañas mediáticas nacionales o los planes de estudio a nivel nacional, en tanto que las percepciones negativas pueden mitigarse más eficazmente a través de intervenciones dirigidas a aldeas y conflictos específicos.

RÉSUMÉ

Les relations que les communautés locales entretiennent avec les aires protégées sont importantes pour le succès de ces zones. Cependant, il est difficile de rendre compte des relations entre parc et habitants à une échelle pertinente pour la gestion et la planification de la conservation. Pour mener cette recherche sur la perception des gens concernant les aires protégées, nous avons examiné la contribution relative que certains facteurs de niveaux différents (village, aire protégée, pays, etc.) ont apporté aux attitudes et perceptions des gens à l'égard des aires protégées. Sur la base de 3573 enquêtes individuelles menées dans 140 villages situés autour de trois aires protégées au Népal et de quatre au Myanmar, nous avons constaté des tendances indiquant que les perceptions négatives de la population étaient influencées par des facteurs au niveau des villages et des aires protégées. En revanche, des facteurs au niveau national ont influencé les perceptions positives, telles que l'appréciation des avantages apportés à la conservation, aux services écosystémiques et aux activités de loisirs. Nos résultats suggèrent qu'une approche multiniveau peut améliorer la compréhension des relations entre parc et habitants et contribuer à une meilleure planification et gestion, favorisant par voie de conséquence les relations entre parc et habitants. Par exemple, des interventions au niveau national, telles que des campagnes médiatiques nationales ou les programmes éducatifs nationaux, peuvent favoriser les perceptions positives, tandis que les perceptions négatives peuvent être atténuées de façon efficace grâce à des interventions ciblées au niveau des villages et des conflits.