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Determinants of Local People's Perceptions and Attitudes Toward a Protected Area and Its Management: A Case Study From Popa Mountain Park, Central Myanmar

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The attitudes and perceptions of local people are important for long-term survival of protected areas. Some studies have shown that people's perceptions and attitudes are shaped by knowledge about protected area goals and characteristics and related socioeconomic factors. In this study, socioeconomic status, knowledge of protected area characteristics, perceptions of benefits and costs of protected areas, and attitudes toward two management programs were examined for people in 208 households from 14 villages around Popa Mountain Park, Central Myanmar. Approximately 50% of respondents had basic knowledge about the park; 38% perceived benefits and 45% perceived losses due to the park. Approximately half held positive attitudes toward buffer zone establishment and replacement of banana plantations. Logistic regression revealed that perceptions of benefits and positive attitudes toward management were correlated with both sociodemographic characteristics and knowledge, while perceptions of losses and negative attitudes toward management were influenced by economic concerns.

Keywords attitude, community education, knowledge, local people, perception, protected area, socioeconomic condition

Protected areas (PAs) are cornerstones for biodiversity conservation (Allendorf 2007; Walpole and Goodwin 2001) and are a major means of reducing deforestation (Andam et al. 2008). PA management often includes strict regulations that exclude local people from areas that they may have previously used to gather resources such as fuelwood, materials for shelter and farming, fodder and nontimber forest products (Alkan, Korkmaz, and Tolunay 2009; Shrestha and Alavalapati 2006). Thus, the management of PAs may conflict with the economic interest of local people (Khan and Bhagwat 2010; Shrestha and Alavalapati 2006).

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Without local support, the long-term existence of PAs is not assured (Wells and McShane 2004). Local people are unlikely to support PAs if they have negative perceptions and attitudes toward them (Alkan et al. 2009). An attitude is a cognitive evaluation of a particular entity with favor or disfavor, and it reflects the beliefs that people hold about the attitude object or entity (Eagly and Chaiken 1998). Beliefs are the associations that people establish between the attitude object and various attributes (Allendorf 2007). Attitudes toward PAs, conservation, or wildlife may be influenced by PA staff or management interventions, local economic needs and history, or other indirectly related socioeconomic factors such as government policy. The cognitions or thoughts that are associated with attitudes are typically termed beliefs by attitude theorists (Eagly and Chaiken 1998). Perception refers to people's beliefs that derive from their experiences and interaction with a program or activity. Xu et al. (2006) argue that local people's perceptions are related to costs and benefits produced by PAs, their dependence on PA resources, and their knowledge about PAs.

The influences of socioeconomic characteristics on local people's perceptions and attitudes toward an adjacent PA are often site-specific and inconsistent (Allendorf et al. 2006; Baral and Heinen 2007; Mehta and Heinen 2001; Rao et al. 2003; Shibia 2010; Shrestha and Alavalapati 2006; Xu et al. 2006). Some studies report that education is a strong predictor of attitude (Allendorf et al. 2006; Mehta and Heinen 2001; Shibia 2010; Shrestha and Alavalapati 2006; Xu et al. 2006), while others have found no correlation between educational status and people's perceptions and attitudes (Baral and Heinen 2007; Mehta and Heinen 2001). Mehta and Heinen (2001), Allendorf et al. (2006), and Xu et al. (2006) reported that women were less likely to hold positive attitudes, whereas Baral and Heinen (2007) and Shibia (2010) found no correlation between gender and attitude. Allendorf et al. (2006) and Shrestha and Alavalapati (2006) found that individuals from larger families have negative attitudes to PAs, whereas Xu et al. (2006) reported that individuals from larger families hold positive attitudes toward PAs.

Jim and Xu (2002) and Alkan et al. (2009) argue that local people's perceptions and attitudes are shaped by their knowledge about the neighboring PA. This knowledge might include objectives, activities, size, regulations, or location of the boundary of PAs (Jim and Xu 2002; Rao et al. 2003; Xu et al. 2006). The knowledge is gained empirically through one's perceptions, and it is the recognition of something sensed or felt (Ziadat 2010). It is important to investigate whether more knowledge of PAs would be associated with positive perceptions and attitudes toward them. We examined the effects of both knowledge and socioeconomic factors on the perceptions and attitudes of local people toward Popa Mountain Park, in central Myanmar, and its management through a questionnaire survey.

Myanmar is one of the biodiversity hotspots in the world, and its PAs play a crucial role in conserving the country's rich biodiversity (Myers et al. 2000). During the last 10 years the number of protected areas in Myanmar has increased from 20 to 42, covering 7.3% of total land area of the country (Nature and Wildlife Conservation Division 2008). The Nature and Wildlife Conservation Division (NWCD) of the Forest Department, Ministry of Forestry, is mainly responsible for PA management in Myanmar. Generally, PAs in Myanmar can be categorized into national park, marine park, wildlife sanctuary, nature reserve, and zoo park. Although Myanmar's PAs do not fully conform to PA categories of the International Union of Conservation of Nature (IUCN), they are most similar to IUCN category IV (Aung 2007).

Myanmar's PA management rules and regulations prohibit local people from using resources within PAs. Conflicts arise as local people often have no other source of resource than the PA. Rao, Rabinowitz, and Khaing (2002) reported that nontimber forest products were extracted from 85% and fuelwood was collected from more than 50% of PAs in Myanmar. The mean annual population growth rate is 2.1% (Central Statistics Organisation 2006) and is highest in rural areas where most Myanmar PAs are located. Population increase is linked to an increase in the number of people seeking land for grazing, collecting fuelwood, and extracting timber and other forest products. The rapid growth of PAs and the huge pressures placed on them by the increasing human population are a great challenge for sustainable PA management.

Popa Mountain Park (PMP) possesses a diverse forest ecosystem in central Myanmar where most forests have already disappeared. PMP was selected for the present study for two reasons: (1) a historic relationship between PMP and local communities and (2) high people's pressure on the park resulting from the high population density together with resource scarcity in the surrounding area. The Forest Department has had great success in the reforestation of Popa Mountain, which is a high priority for forest conservation. It is important to understand local people's perceptions and attitudes toward PMP for its sustainability. The objectives of the present study were (1) to examine the responses of local people toward the park and its management and (2) to study how local people's perceptions and attitudes toward the PA and its management relate to their socioeconomic status and knowledge about the park.

Methods

Study Area

Popa Mountain Park is located in the central dry zone of Myanmar (Figure 1). Mount Popa, the only prominent extinct volcano in Myanmar, was first established as Popa Reserved Forest in 1902 and was declared as Popa Mountain Park in 1989 to maintain its regionally unique ecosystem dominated by dry mixed deciduous forest. The park covers approximately 100 km². More than 100 springs in PMP supply drinking and irrigation water to thousands of people in the surrounding area. Mount Popa is famed for high plant diversity and as a source of medicinal plants. There are very limited populations of small mammals such as wild dogs (*Cuon alpinus*), muntjac (*Muntiacus muntjak*), wild pigs (*Sus scrofa*), and monkeys (*Macaca assamensis*, *Presbytis phayrei*), and hunting pressure is low. A volcanic plug, called Taung-kalat, at the western foot of Mount Popa is a prominent landmark. It is one of the most famous religious sites in Myanmar and several thousand people visit it each year for religious and tourism purposes.

The major objectives of PMP are forest conservation, protection of the watershed of Kyet-mauk-taung dam located to the south of the park, conservation of medicinal plants for sustainable use, preservation of existing religious sites, and ensuring sustainability of water sources (natural springs). Park management duties include patrolling, fire protection, tree planting, conservation of medicinal plants, and infrastructure development (mainly roads and water-supply facilities). PMP management is mainly overseen by the staff from outside the region. The PMP staff conducts an environmental and conservation education program in surrounding villages. The

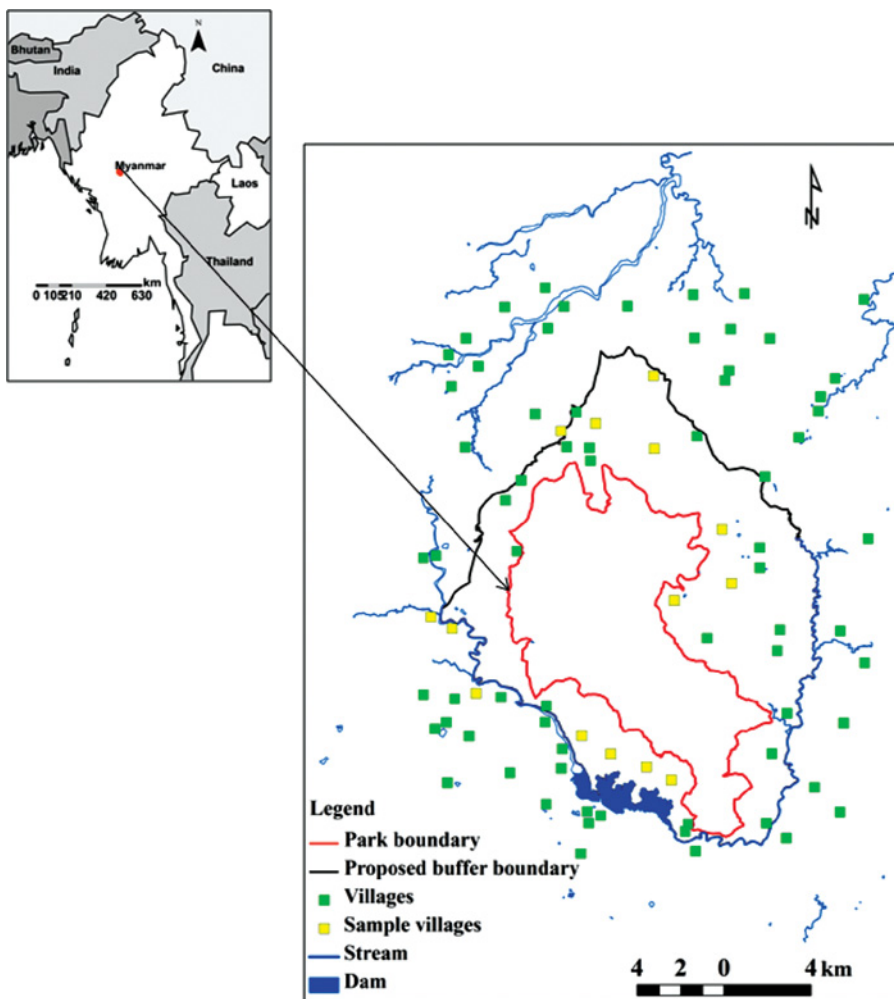


Figure 1. Map showing the location of Popa Mountain Park, Myanmar. (Color figure available online.)

program involves three or four staff visiting the villages around the park and explaining about the park and the importance of biodiversity conservation.

Communities Around PMP

There are 45 villages scattered around PMP and the total population was 50,919 in 2005 (source: local administration office). Agriculture is the most common livelihood. The agricultural practices differ between the eastern and western sides of the park. Villagers on the east side mainly cultivate bananas, fruits, and other seasonal crops, whereas on the west side the main activities are rain-fed paddy rice, palm-sugar production, small-scale fisheries, and seasonal crops. Collection of fuelwood, collection of forest products, and grazing are common human activities within the park (Rao et al. 2002).

There is a long history of interaction between PMP and the local communities, as described in the 1981 master plan for the proposed gazettal of the park (Forest

Department 1981). Even after the area was declared a forest reserve in 1902, people continued to use the reserve and opened up new areas for cultivation, mainly of bananas, before and after the Second World War. The Forest Department conducted extensive reforestation during 1955–1972 and illegal cultivators were removed from the reserve. However, 444 families from 19 villages were allowed to continue to cultivate 400 ha of land inside the reserve. The vegetation gradually recovered in reclaimed areas and once-depleted natural springs reestablished. After PMP was declared in 1989, permission to continue cultivation inside the park was revoked and farmers were allocated other lands placed outside and west of the park in compensation. However, the compensatory lands were infertile and most of the farmers returned to their original villages and lived on their remaining small farmland or worked as laborers, resulting in a considerable economic disadvantage to those people.

The relationship between the park and the local people is currently affected by two management initiatives. The first is a proposal to establish a buffer zone surrounding the park where vegetation utilization would be regulated to provide better protection for the forest inside the park. The buffer zone management would protect the remaining forest, regulate resource extraction on a sustainable basis, and plant trees in degraded areas. Many villages and cultivated areas lie within the proposed buffer zone, leading to local anxiety and opposition to the policy.

The second management initiative is a program of banana plantation removal. Bananas are extensively planted in areas on the eastern boundary of the park and the practice is a major means of livelihood of people living in this area. The Forest Department regards banana cultivation as detrimental to surface water resources due to its high water consumption and began a program in 1998 to phase out bananas by encouraging cultivators to interplant them with trees for timber and perennial crops, to replace bananas as a source of income. The Forest Department provided seedlings to local people (Nature and Wildlife Conservation Division 2008), but banana cultivators have not responded well as bananas are the major source of their income and the initiative has not been very successful.

Data Collection

Data were collected by a questionnaire survey in December 2006 and January 2007 using stratified random sampling. Villages surrounding the park were divided into two groups, east or west, based on the clear difference in agricultural practices between the two areas. From each group, 7 villages were randomly selected because of the time limitation and 208 households (16 each from 12 villages and 8 each from 2 smaller villages) were randomly selected from the village register. Approximately 7% of the total households (~3,000) were surveyed. Thirty-three households of employees of PMP were excluded before the household selection process in order to avoid the influence of park authority in the study. The most senior member of the household present at the time of the visit was interviewed. The survey team successfully interviewed all respondents.

We recorded nine socioeconomic variables of the respondents: location (eastern or western side of the park), accessibility (proximity of the village to a main road), education, gender, age, farm size (acreage of farm owned by the respondent's family), family size (number of members in the respondent's immediate family), occupation (farmer or not), and village size (Table 1). The survey used fixed response questions with some supplementary questions designed to gain in-depth understanding of the answers (Xu et al. 2006). Questions were structured in three parts.

Table 1. Characteristics of the respondents of the survey in Popa Mountain Park, Myanmar

Descriptor	Attributes	Frequency	Percent	Code
Location	West	112	53.8	0
	East	96	46.2	1
Access	Moderate (not accessible directly by main road)	128	61.5	0
	Good (located beside the main road)	80	38.5	1
Gender	Female	40	19.2	0
	Male	168	80.8	1
Occupation	Nonfarmer	62	29.8	0
	Farmer	146	70.2	1
Family size	≤4 Members	97	46.6	0
	>4 Members	111	53.4	1
Village size	≤200 Households	119	57.2	0
	>200 Households	89	42.8	1
Age	≤40 years	53	25.5	0
	41–60 years	105	50.5	1
	>60 years	50	24	2
Education	≤Primary (grades 1–4)	133	63.9	0
	Middle (grades 5–8)	56	26.9	1
	≥Higher (grades 9–10 and above)	19	9.1	2
Farm size	0 acre	51	24.5	0
	1–5 acres (0.40–2.02 ha)	103	49.5	1
	>5 acres (2.02 ha)	54	26	2

The first section (Table 2) assessed respondents' knowledge of the park. Respondents were asked whether they knew about the objectives, activities, boundaries, and laws of the park. Respondents who answered "yes" were asked supplementary questions about their knowledge of specific objectives and activities and to describe which actions inside the park are illegal. The second section (Table 3) examined perceptions of the park establishment, specifically, whether park establishment had brought benefits or losses and what those were. The third section (see Table 3) examined attitudes toward the buffer zone and banana replacement interventions. The respondents were asked whether they agreed or disagreed with each of these initiatives. Before conducting the survey, we conducted a preliminary survey to test the questions, and we found that it was difficult to get the reasons for agree or disagree on management interventions, so the respondents were asked whether they agreed or not with the management interventions. Informal discussions were also conducted with village heads, elderly villagers, and respondents who voluntarily participated in discussion to gather more information to assist with the interpretation of the responses.

Characteristics of the Respondents

Respondents were nearly equally distributed between east and west, but less than half of all villages could be accessed directly by road (see Table 1). Most respondent were male and farmers, and their ages were between 19 and 78 years. Only a few

Table 2. Respondents' knowledge about Popa Mountain Park, Myanmar

Categories	Responses	%
Objective		
Do you know the objectives of the park?	Yes	52
	No	48
If yes, list any objectives that you know.	To conserve forest	90
	To protect watershed	23
	To maintain water sources	15
	To protect medicinal plants	7
	To maintain religious site	3
Activities		
Are you aware of activities of park managers?	Yes	49
	No	51
If yes, list any functions that you know.	Patrolling	54
	Banana replanting	39
	Planting	20
	Infrastructure development	13
	Fire protection	7
	Medicinal plant protection	3
Boundary	Boundary demarcation	3
Have you seen the boundary markers of the park?	Yes	54
	No	46
Law		
Do you know the park is protected by the laws?	Yes	56
	No	44
If yes, list any prohibited activities that you know.	Cutting trees	97
	Poaching	96
	Grazing	79
	Collecting fuelwood	69
	Collecting nonwood forest products	53
	Trespassing	45

respondents had a high school education or above. Village size ranged from 73 to 581 households. Only about one-fourth of respondents had no farmland, while another one-fourth held farmland of more than 5 acres (2.02 ha). Family size varied from one to eight members.

Analysis

Logistic regression models were used to examine relationships between perceptions and attitudes as dependent variables and knowledge and socioeconomic factors as independent variables in the Statistical Package for the Social Sciences (SPSS, Inc. 2007). The socioeconomic variables were grouped and codes were assigned for each attribute for the purposes of logistic regression (see Table 1). We also assigned codes for knowledge, perceptions, and attitudes (yes/agree = 1 and no/disagree = 0).

Table 3. Respondents' perceptions and attitudes toward Popa Mountain Park, Myanmar

Categories	Responses	%
Perceptions		
Does the establishment of the park bring you benefits?	Yes	38
	No	62
List any benefits that the park brings to you.	Economic development	55
	Better climate	51
	Enjoying environment	25
	Water security	23
	Forest products	20
	Fuelwood	17
	Medicine	14
	Food	13
	Transportation	6
Does the establishment of the park bring you losses?	Yes	45
	No	55
List any losses that the park brings to you.	Restrictions on access to forest products	36
	Banana removal	34
	No land for agricultural extension	30
	Ban on fuelwood collection	28
	Land loss	21
Attitudes		
Do you agree with buffer zone establishment?	Agree	53
	Disagree	47
Do you agree with banana removal?	Agree	51
	Disagree	49

Multicollinearity between independent variables (knowledge and socioeconomic factors) was checked using tolerance tests (Menard 2001) before running logistic models; multicollinearity is considered high if the tolerance is lower than 0.2. In this study, tolerances ranged from 0.42 to 0.97, which indicates weak correlations between independent variables. Two logistic models were tested using a hierarchical approach in which socioeconomic factors were entered in step one (hereafter referred to as model 1) and knowledge variables were entered in step two (hereafter referred to as model 2). Odds ratios of significant variables were inspected to facilitate model interpretation. Odds ratios greater than 1 will increase the likelihood of the occurrence of the event, and odds ratios less than 1 will decrease the likelihood of the occurrence of the event (Tabachnick and Fidell 2006).

Results and Discussion

Knowledge of PMP

More than half of the respondents stated that they knew the objectives of PMP (see Table 2), and most of them cited forest conservation, watershed protection, and

maintaining water sources as the objectives of the park. Less than half of the respondents were aware of the activities carried out by the park. Patrolling was the most common activity mentioned, followed by banana replacement, tree planting, infrastructure development, fire protection, medicinal plant protection, and boundary demarcation. More than 50% of respondents claimed to know the location of the park boundary. Nearly 56% of interviewees were aware of the laws concerning the park, particularly prohibition of tree cutting and hunting, followed by grazing, fuelwood collection, nontimber forest product collection, and trespassing.

Perceptions of Local People on the Establishment of PMP

Only 38.0% of respondents considered that the establishment of the park had brought either tangible or intangible benefits (see Table 3). Economic development due to better agriculture was the most frequently mentioned benefit, followed by better climate. In model 1 where socioeconomic factors were entered in the first step (Table 4), respondents with middle and higher education were almost 3 and 4 times more likely to perceive benefits than people with lower education (the reference group in the model). Respondents with larger farms also perceived more benefits. In model 2, in which people's knowledge about the park was entered in the second step, educational status and farm size were still positively correlated with perceived benefits. In model 2, farmers were more likely to perceive benefits due to the park than other occupations. Model 2 also showed people who knew about the objectives, activities and boundary of the park were approximately 4, 2, and 5 times more likely to perceive benefits than those who did not.

Forty-five percent of the respondents believed that the establishment of PMP had caused them economic loss and the restriction on the collection of forest products was the most commonly mentioned (see Table 3). When socioeconomic variables were entered in the first stage, people's perceptions of losses due to the establishment of the park were highly correlated with accessibility, gender, village size, age, and farm size (see Table 4). These socioeconomic variables increased the likelihood of perceiving losses between two and five times ($p < .10$). When knowledge was added in the second stage, model 2 showed gender did not significantly influence perception, but accessibility, village size, age, and farm size were significantly and positively correlated with perceived losses. People with knowledge about the objectives of the park were more likely to answer that park establishment had not brought losses, but the other knowledge variables were not significant in the model.

For predictions of perceptions of both benefits and losses, percent correctly classified of the two models increased about 4% and 5%, respectively, by addition of the knowledge variables.

Attitudes Toward Management Interventions

More than 50% of respondents agreed with establishing a buffer zone and replacing bananas with forest trees and other perennial cash crops (see Table 3). In the model for attitudes toward buffer zone establishment using only socioeconomic variables, education and farm size were key determinants (Table 5). Respondents with mid-level education were less likely to agree with the establishment of a buffer zone than respondents with primary and lower education level (the reference group in the model). People with larger and mid-sized farms were more likely to oppose this

Table 4. Predicting the odds ratios of local people's perceptions of benefits and losses due to the establishment of Popa Mountain Park, Myanmar

Variables	Perception of benefits		Perception of losses	
	Model 1	Model 2	Model 1	Model 2
Socioeconomic				
Location (east)	0.570	0.986	0.550	0.619
Access (good)	1.324	1.561	4.761***	6.225***
Gender (male)	1.345	0.863	2.169*	2.069
Occupation (farmer)	1.946	2.067*	1.310	1.245
Family size (>4 members)	0.717	0.647	1.105	1.061
Village size (>200 households)	1.495	1.030	4.388***	3.656**
Age				
≤40 years (reference group)				
41–60 years	0.610	0.726	3.935**	4.250**
>60 years	1.158	1.818	1.675	1.8076
Education				
≤primary (reference group)				
Middle	3.212***	6.110***	1.419	2.808
≥Higher	4.031***	5.312***	0.532	1.015
Farm size				
0 ha (reference group)				
0.40–2.02 ha	1.545	2.502	2.214*	2.485*
>2.02 ha	2.418***	2.798**	0.754	0.538
Knowledge				
Objective		4.546**		0.505*
Activities		2.105*		0.810
Boundary		5.680***		1.344
Law		1.403		1.439
Percent correctly classified	73.1	77.4	74.5	79.8
χ^2	51.82***	104.55***	64.47***	87.57***

Note. The reference group in each explanatory variable is not included.

* $p < .10$. ** $p < .05$. *** $p < .01$.

management intervention than people with no land. Model 2 retained farm size as a predictor and showed that farmers were more likely to oppose buffer-zone establishment and people who knew about the objectives, activities, boundaries and laws of the park were approximately 2 to 4 times more likely to support the establishment of a buffer zone.

When socioeconomic factors were treated as independent variables in the first step (model 1), location, occupation, education, and farm size were significant influences on people's attitudes toward the banana replacement policy (see Table 5). The respondents from the eastern side of PMP were less likely to agree with banana replacement than those from the western side of the park. People with a higher educational status were more likely to agree with the banana removal than those with lower education. Farmers were less likely to agree with the banana replacement

Table 5. Predicting the odds ratios of local people's attitudes toward management interventions of Popa Mountain Park, Myanmar

Variables	Attitudes toward buffer zone establishment		Attitudes toward banana removal	
	Model 1	Model 2	Model 1	Model 2
Socioeconomic				
Location (east)	0.891	1.686	0.288***	0.448
Access (good)	0.848	0.642	0.488	1.976
Gender (male)	1.438	0.973	0.937	0.591
Occupation (farmer)	0.931	1.001	0.224***	0.125***
Family size (>4 members)	0.986	0.731	1.079	1.183
Village size (>200 households)	0.966	0.516	1.259	0.585
Age				
≤40 years (reference group)				
41–60 years	0.612	0.830	1.008	2.125
>60 years	0.671	0.556	0.806	0.946
Education				
≤Primary (reference group)				
Middle	0.206**	0.487	3.961*	23.079***
≥Higher	0.461	1.287	3.816*	25.974***
Farm size				
0 ha (reference group)				
0.40–2.02 ha	0.413**	0.249**	0.481*	0.488
>2.02 ha	0.168**	0.170***	0.606*	0.234**
Knowledge				
Objective		2.322**		7.029***
Activities		3.758***		3.841**
Boundary		2.974***		1.787
Law		3.771***		4.894***
Percent correctly classified	67.8	76.0	71.2	83.7
χ^2	27.31**	91.91***	63.22***	131.76***

Note. The reference group in each explanatory variable is not included.

* $p < .10$. ** $p < .05$. *** $p < .01$.

policy. People with medium and large farms were less likely to support banana replacement than people with no land. In model 2, when knowledge variables were added, occupation, education, and farm size were still significant. Additionally, individuals who knew of the objectives, activities, and laws of the park were more likely to support the replacement of bananas.

The predictive powers of local people's attitudes toward the two management interventions were improved about 8% and 13% by the addition of the knowledge variables.

The present study found nearly half of the respondents did not possess even the most basic knowledge of the management objectives and activities of PMP. In practice, the community outreach program by PMP management is limited by financial

constraints. Furthermore, the community extension program appears less effective than other information distribution approaches, as people mentioned that they mainly received information about the park from the posters put up in schools or at the village head's house. This is critically important, as the models demonstrate that knowledge of the park and its management activities appears to increase positive perceptions of the benefits of the park and attitudes to management intervention. The management approach practiced in PMP is consistent with the general approach to protected area management in Myanmar. The authorities at PMP do not consider the views of neighboring communities in the formulation of park management activities, and communication between park management and neighboring residents is minimal. This approach, together with the lack of an effective extension program, resulted in the limited knowledge of local people about the park.

The finding that people with higher educational status were more likely to perceive benefits is consistent with other studies (Akama, Lant, and Burnett 1995; Bandara and Tisdell 2003; Fiallo and Jacobson 1995; Heinen 1993; Infield 1988; Jim and Xu 2002; Mehta and Heinen 2001; Xu et al. 2006). Respondents working larger farms were more likely to believe that the park provided benefits than those without farms. PMP is well watered in comparison with most places in central Myanmar that are subject to drought. Favorable cultivation conditions, particularly water resources, advances in agricultural techniques, and the development of the market economy, have resulted in better returns for people with larger farms.

Respondents in villages with good road access perceived more losses than those without good road access due to the park's establishment. This might relate to the confiscation of land of the people from three of the sample villages (which all had good accessibility) without adequate compensation for a government-run pozzolan plant constructed in 2000–2001. (Pozzolan is a cement additive derived from volcanic ash.) Although neither the park nor the Forest Department was involved in the confiscation, this event undoubtedly created resentment toward government in general, as reflected in negative perceptions of the park by people from accessible villages (informal discussions).

More negative perceptions among those from larger villages may arise from the lack of available land for expanding cultivation. During informal discussions, some people expressed the desire to expand their agricultural land to meet the increasing needs of their families. Older people's greater perception of losses may be attributed to the loss of land and access to forest resources. Other studies have also reported that the restriction of access to traditionally used resources and the displacement of people from their land can produce negative consequences for local communities and give rise to negative perceptions (Adams and Infield 2001; Fiallo and Jacobson 1995; Heinen 1993; Newmark et al. 1993).

The present study revealed that people who had basic knowledge about the park and people who had advantage of some socioeconomic conditions, such as higher education and bigger farm size, perceived positive benefits of the park. The percent correctly classified of the models indicates that the perceptions about PA costs and benefits are connected to how much they know about it (see Table 4). Negative perceptions were largely associated with the economic hardship.

The present study found that people's knowledge about the park influenced their positive attitudes, while fear of economic losses increased negative attitudes toward the management interventions. The more positive attitudes among the respondents

who knew about the park might relate to their awareness of the allowance of appropriate resources collection in the buffer zone, which would maintain long-term resource availability. The positive relationship between knowledge and attitudes toward banana removal might be due to people's awareness of water security and understanding that the income obtained from certain perennial crops (cashew and good mango varieties) would surpass the income obtained from banana in the same unit of land. Informal discussions revealed that there was less opposition to buffer zone establishment per se, but respondents were anxious about losing their land or having to relocate. Several villages and cultivated lands are located within the proposed buffer area. One solution is to exclude the villages and cultivated areas from the buffer zone and only include the remaining natural forests. Park management could begin to address these concerns by explaining that customary rights to resource utilization are guaranteed by Articles 9 and 14 of the Protection of Wildlife, Wild Plant and Conservation of Natural Areas Rules of Myanmar and would not be affected by the buffer zone. The more negative view of the banana removal policy on the eastern side of the park may have been due to a fear of direct loss of income during the transition period of 2–4 years while alternative crops become established.

Individuals who understood the objectives of the park were aware that PMP sustains and protects regionally valuable forest and water resources. Respondents who knew about the park's activities believed that park regulations are critical to achieving park management objectives. For example, when respondents were asked about their attitudes toward park abolishment, very few (<2%) respondents agreed with abolishing the park. Respondents were concerned that park abolishment would adversely affect the climate, environment, forest, and water resources, and that would be detrimental to their livelihoods. This finding indicates that local people might have more positive perceptions and attitudes toward the park if they were not concerned with economic hardship.

Activities such as a community outreach program, socioeconomic development initiatives, and people's participation in biodiversity conservation can increase local support for PAs (Adams and Infield 2001; Anthony 2007; Badola 1998; Bajracharya, Furley, and Newton 2006; Baral and Heinen 2007; Jim and Xu 2002; Mehta and Heinen 2001; Mehta and Kellert 1998). The rationale behind such initiatives is to stimulate support of local communities for conservation.

Our findings suggest that programs that increasing people's knowledge or awareness about the park and its management and raising the livelihoods of economically disadvantaged people might increase positive perceptions and attitudes toward the park. The park should emphasize the implementation of an effective outreach environmental education program to raise local people's awareness, as the park's current educational program seems to be not so efficient. Socioeconomic and cultural factors influencing perceptions and attitudes should be included in a community outreach program (Holmes 2003), and such inclusion would enable to implement an effective outreach program. We also believe that a greater effort is needed to build a relationship with the local communities. In Myanmar, the approach to protected area management has been to protect the park from illegal activities through patrols, following the common "fines and fences" method (Abdullahi et al. 2007; Holmes 2003; Infield and Namara 2001; Shrestha and Alavalapati 2006). Park authorities rarely investigate complaints from the public regarding management interventions or disseminate reliable information (informal discussion). In a case study of the Nanda Devi Biosphere Reserve in India, Rao et al. (2003) found that the failure of

park managers to understand the aspirations and perceptions of local people led to opposition to management measures despite support of the conservation objective. Participation in decision making for management intervention might be one way of improving the people–park relationship.

People living around PMP were concerned with restricting access to forest products, removing bananas, and restricting agricultural extension. These restrictions impose economic hardship on local people. The models showed local people with no land or small farms had negative perceptions of the park. In this area as elsewhere in rural Myanmar, farm size is an indicator of wealth. Therefore, it would be necessary to implement socioeconomic development initiatives for poor people living around the park. As the state provides few funds for conservation, donations should be sought from external conservation organizations for practicing development initiatives. Such initiatives should be carefully selected, tentative, small-scale income-generating activities with genuine local support and real prospects of sustainability, and the programs should also reflect clear benefits the park (Wells and McShane 2004).

The present study examined the influence of knowledge and socioeconomic conditions on local people's perceptions and attitudes toward PMP. Perceptions of benefits and positive attitudes were to some extent correlated with basic knowledge about the park, and perceptions of losses and negative attitudes were influenced by economic hardship and concern for economic loss. People's participation is required in decision making for management interventions so that their needs and aspirations are included in the interventions. Multiple activities, including improving education level and knowledge and providing socioeconomic development for poor people, should be conducted. Improving the socioeconomic development of local people would especially help to decrease negative perceptions and attitudes. The findings may assist planning to reduce people–park conflicts and to gain local support for conservation and sustainable park management. A larger scale study that includes more PAs and considers impacts of cultural and different ethnic communities would provide more information to support sustainable PA management.

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