Assessing Local People' Perceptions and Attitudes on Protected Areas in Popa Mountain Park, Myanmar

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Abstarct: Understanding conservation attitudes of local communities is essential to the long -term survival of protected areas. Perception and attitudes towards protected areas may greatly be influenced by the various kinds of relationship that exists between the local communities and the protected area management. Studies that have focused on local people's responses to protected areas indicate that attitudes towards protected areas and conservation in general are also greatly influenced by benefits obtained. This study aims to explore the factors influencing conservation attitudes of villagers who live near around the Popa Mountain Park (PMP) in Myanmar. A sample of 174 households was randomly selected from three villages adjoining the Park to collect the data using structured questionnaire interviews, focus group discussion with local residents and directly observation to the environment. Logistic regression analysis was applied to determine which significant factors influence in predicting attitude towards conservation. Logistic regression showed that forest dependency and limited access to forest resources are found to be significant predictors of conservation attitudes. The findings go along with most of similar studies that, providing alternative source of income for the livelihood through employment opportunities or by an income source from agricultural will greatly reduce the forest dependence. The research concluded that consideration to household socioeconomic characteristics near around the PMP is essential in protected area management. The study recommends that environmental education programme should be encouraged in order to reduce dependence on the protected forests. Moreover, the government should consider measures to increase agricultural production and generate off-farm employment opportunities for local communities in general and strengthen conservation activities especially around the Popa Mountain Park.

Keywords: Socio-economic Characteristics, Conservation Attitudes, Popa Mountain Park (PMP), Protected Area, Myanmar

1. Introduction

Most of the protected areas in the world are important not only for their biodiversity conservation, but also for their natural resources that many local people rely on for their livelihoods. Forest resources from National park play important roles for the livelihoods of local people due to extreme poverty. The relationship between protected areas and livelihood has been the most outstanding issue in conservation in developing countries. People are more likely to appreciate protected areas if benefits gained from them offset the associated costs (Ormsby and Kaplin 2005). Benefits can be obtained through resource extraction, employment, development, or tourism (Allendorf 2007), but can also be noneconomic, such as recreation and aesthetics (Allendorf et al. 2007, Silori 2007). Local costs created by protected areas include human and wildlife conflicts, land pressure, loss of resources, and forfeited economic opportunities (Infield and Namara 2001, Heinen and Shrivastava 2009, Shibia 2010), and can determine overall negative attitudes.

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. Conflicts with managers due to resource extraction, strict rules on forest resources use, and access (Heinen and Shrivastava 2009, Shibia 2010), rude behavior (Ormsby and Kaplin 2005), or harassment by park rangers (Infield and Namara 2001) generate negative attitudes toward protected areas. Fear of resettlement and lack of job provision have the same impact (Allendorf 2007). A low level of awareness regarding conservation issues and protected area management practices can also be associated with negative (Fiallo and Jacobson 1995) or ambivalent attitudes (Ormsby and Kaplin 2005) toward protected areas. However, higher level of awareness on regulations can be associated to negative conservation attitudes (Heinen and Shrivastava 2009). The lack of involvement of the local community in the decision making processes and in forest management groups are also important determinants of negative attitudes toward protected areas (Silori 2007). Where there is local people's participation in decision-making or some form of consultative process, attitudes towards the protected area will often be positive. Expansion of PAs in community territories may invoke emotive experiences of past displacements, which could trigger negative perceptions towards PAs (Gladman Thondhlana & Georgina Cundill 2017)

Other factors such as age and education level of the local people may as well have an influence in shaping people's attitudes (Jim and Xi 2002). The figure below (Figure 2.2) gives a general summary of some of the factors perceived to influence people's attitudes towards protected areas and conservation in general.

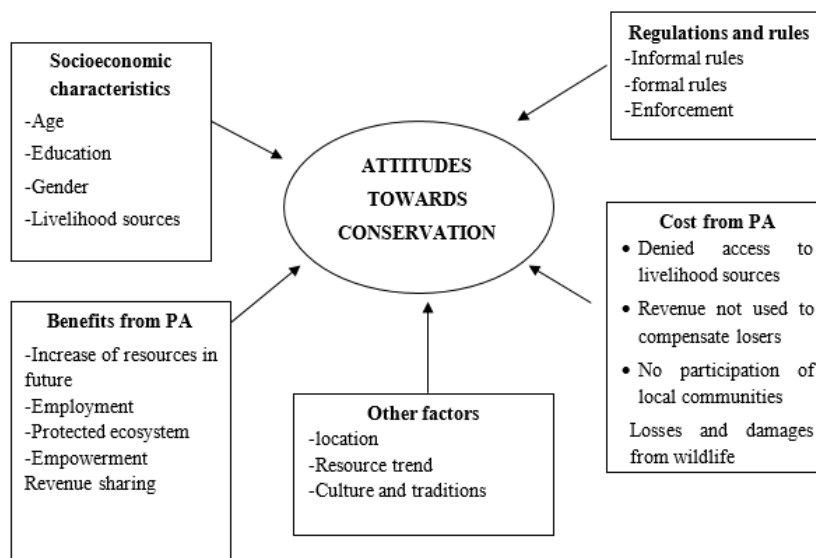✎ **Theint Theint Htun (Correspondence)**
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Fig 1 A summary of factors that influence attitudes towards conservation

Myanmar represents an important biodiversity reservoir with a great variety of different habitat types arising from its ecological diversity in Asia-Pacific regions. Because of the tropical monsoon cycling system and its topographic variety throughout the country, diverse ecosystems with lots of genetic diversities can be found in Myanmar's forests. In Myanmar, forest resources are conserved, managed and utilized in sustainable manner by the establishment of Reserved Forests (RFs), Protected Public Forests (PPFs) and Protected Areas (PAs). Protected areas (PAs) are main tools for biodiversity conservation and sustainable development. The national target for PA coverage is set to increase 10% of total land area by 2030 in Myanmar's 30-year National Forestry Master Plan. To date, Myanmar has designated 39 PAs covering 38,906 km^2, representing country's diverse forests have been established, and it is about 5.75% of Myanmar's land area. Seven additional areas have been proposed, which would cover a further 1.09%. Despite the protected areas are given legal backbone, encroachments and threats are still common in Myanmar's protected area (Rao *et al.* 2002). Although Myanmar's PA management rules and regulations prohibit local people from using resources within protected forest area, there is a lot of encroachment to it. Conflicts arise as local people often have no other source of resource than the PA. Rao, Rabinowitz, and Khaing (2002) pointed out that non timber forest products were collected from 85% and fuel wood was extracted from more than 50% of PAs in Myanmar. Moreover, annually the mean population growth is highest in rural areas where most Myanmar PAs are located. Increase in population growth is linked to an increase in the number of people seeking land for grazing, amassing fuel wood, and collecting forest products. The increase in number of PAs and the huge pressures on them by rapidly growing human population are a great challenge PA management to be sustainable.

Like many other developing countries, the conflict between the protected area and local people is the major threat which hinders to achieve the conservation objectives in Myanmar. Local people are excluded from the protected area by imposing regulations to restrict resource exploitation from the area that used to be important source for their livelihoods and survival or as their main economic alternatives and resulted to conflicts between local people and park. Clear understanding of their attitudes towards protected areas is very important to formulate policies to conserve biodiversity and find alternative economic opportunities. Therefore, this study aims to understand socio-economic conditions of local people, their perceptions and attitudes in order to advance harmonious development of nature conservation and suggest some solutions for the current protected area management systems of the Park in Myanmar.

2. Study Area

Popa Mountain Park (PMP) holds diverse habitat types of natural and anthropogenic vegetation cover. Popa Mountain Park is located within the "tropical dry life zone" in central Myanmar. Its geocoordinates is 25° 56′ N - 95° 16′ E. Mount Popa, which is the highest in central Myanmar, is well known for its unique flora richness in very harsh environment of central Myanmar and is an extinct volcano and one of the important pilgrim lands in Myanmar. Mount Popa reserved forest was firstly established in 1902. In 1958, a large area surrounding the existing reserved forest was proclaimed as a protected area. The area of the park is about 129 km^2. The area surrounding Popa Mountain is somewhat densely populated and there are 45 villages scattered around the foot of the mountain. Total households were 6,842 in 1990 with

the population of round about 36,761 and increased in to 50,919 in 2005(*source: local administration office*). The people are mainly farmers and their main crops are rice, sesame, maize and tomato. Bananas are extensively cultivated in the eastern part of the park and some perennial crops such as mango, cashew, papaya, coffee etc. are intercropped with banana. Toddy palms are an important tree crop for people living in the western part and jaggery production is a mean livelihood, which consumes large quantities of fuel wood.
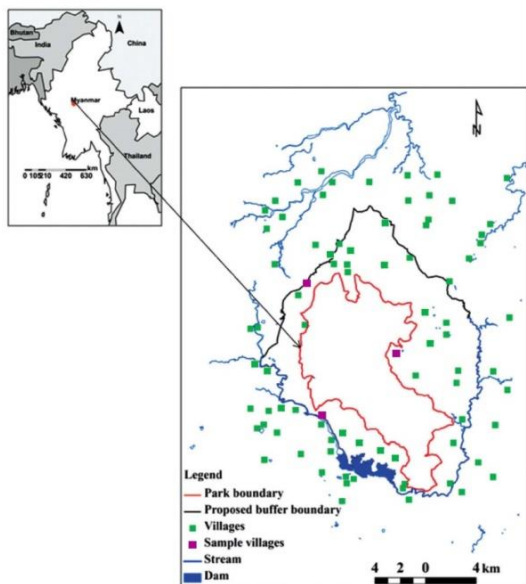

Fig 2 Map of the study area

3. Materials and Methods
3.1 Sampling and Data Collection

$$n = \frac{N}{1 + N(e)^2}$$

There are 436 total households in three study villages. The sample size for each village was calculated by using Yamane's formula. Thus, the result of sample size calculation is 174 (see table 1).

Where,

n = sample size , N = total number of households in the sampled villages

e = precision level

Tab 1 Sample households of the three villages

No	Village	Total Households	Sampling Households
1.	Shaw Taw	206	67
2.	Let Pan Aint	110	52
3.	Popa Lwin	120	55
Total Sampling Households		**436**	**174**

The Field survey work for this research was carried out in and around the villages of Popa Mountain Park in July and August 2022. To fulfill the research objectives, field data collection is mainly based on exploratory social survey research method. The purpose is to analyze the actual inter-links between the protected area and the local people. Based on accessibility, nearness to forests and dependency on forests for livelihoods in a protected area, the study was carried out in Popa Mountain Park in Mandalay Region of Myanmar. The primary data was collected using Reconnaissance Survey, Household (Questionnaire survey), Key informant interview, Informal and formal discussion and Directly Observation. The collected data were analysis using Excel 2010 and STATA version 13. The analyzed data were interpreted using charts, graphs, figures, tables and texts.

3.2 Methodology
Estimation of Forest Conservation Attitude

The local community's conservation attitude was analyzed as a function of respondent's characteristics and a set of socioeconomic factors. The respondents around the Park expressed their attitudes towards conservation by accepting or rejecting several statements. Logistic regression analysis was applied to interpret which factors were significant indicators in predicting attitude towards conservation and to assess the relationship between socioeconomic factors and conservation attitude.

$$\ln\left(\frac{Pi}{1-Pi}\right) = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots\ldots\ldots\ldots \beta_n X_n$$

where   i = i th observation,
Pi = Probability of dependence on the forest,

β_0 = Intercept which is the estimation of probability of dependence on the forest when X = 0,

    β_1 to β_n = Coefficients associated with explanatory variables,

Xi-n = independent variable
Based on the conceptual framework discussed above, the socioeconomic variables definitions and their and their expected sings for forest conservation attitude are shown as follows.

Tab. 2 Variable definitions and their expected sign for forest conservation attitude model

Variable	Variable definition	Expected sign
EDU	(Respondent's level of education)	positive
AGE	(Respondent's age in years)	Positive/neg.
BFFPF	(1 if respondent's family benefits from the protected forest, 0 otherwise)	Positive
LANDLIM	(1 if respondent's important issue facing the community is land scarcity, 0 otherwise)	Negative
LIMAC	(1 if respondent's important issue facing the community is limited access to forest resources/ products, 0 otherwise)	Negative
DEPINX	(1 high dependence, 0 otherwise)	Negative
RESIDENCY	(respondent's residency length in year around the protected forest)	Negative

4. Assessment of Local People's Attitude Towards A Protected Area And its Management
4.1 Socio-economic characteristics of the respondents
4.1.1 Age and Gender of Respondents
According to the descriptive statistics analysis, average age of the household heads was 51.44 years with a minimum of 26 years and maximum of 78 years old. Of the 174 responses, 61.49 % and 38.51 % were male and female respondents respectively. Table 3 describes the percentage of male and female respondents in the household surveys.

Tab 3 Gender of Respondents

Gender Categories	Frequency	Percentage	Cumulative Percent
Male	107	61.49	61.49
Female	67	38.51	100.0
Total	**174**	**100.0**	

Source: Household Survey (2016)

4.1.2 Household Size of Respondents
The descriptive statistics shows that the range of household size is from 1 (minimum) to 7 (maximum), and the average household size is 3.93 (standard deviation sd = 1.30). Household size was classified into three levels: small (1-3), medium (4-5), and big (6-7) (Table 4). Medium household size got the majority of households in the study area. Based on the result from the regression analysis, there was statistically significant difference on household size in three study sites.

Tab 4 Household size of Respondents

Household size category	Frequency	Percent	Cumulative Percent
1 - 3	67	38.51	38.51
4 - 5	88	50.57	89.08
More than 6	19	10.92	100.0
Total	**174**	**100.0**	

Source: Household Survey (2016)

4.1.3 Educational Level of Respondents
Table 5 describes the educational status of household survey respondents for the study sites. The primary education from Grade 1 to Grade 4 is the highest in all study sites followed by about 84% of respondents from all study sites. The second highest majority is illiterate in which the respondents have no educational status at all showing about 77% of the respondents. The average education level is 1.66. As per statistical analysis for two independent sample t-tests, there was no significant difference among education levels of respondents from my study sites.

Tab 5 Education Level

Educational Level	Frequency	Percent	Cumulative Percent
Illiterate	77	44.25	44.25
Primary	84	48.28	92.53
Middle	9	5.17	97.70
Colleague/University	4	2.30	100.0
Total	**174**	**100.0**	

Source: Household Survey (2016)

4.1.4 Land Ownership
Land ownership refers to the land holding of respondents used mainly for cultivation of fruits, bananas and seasonal crops production. Only 33.33 % of the households are agricultural landless and the remaining households own agricultural land. The average agricultural land size is 1.66. Table 6 shows that the majority (50%) of respondents' families has land less than 2 acres. While 23.56% of respondent's families possess land between 2 and 3 acres; and 25.86 % of them have land more than 3 acres.

Tab 6 Respondents by land ownership

Land Ownership(ac)	Number(family)	Percent
Less than 2	88	50.58
Between 2 and 3	41	23.56
More than 3	45	25.86
Total	**174**	**100.0**

Source: Household Survey (2016)

4.2 Contribution of different major forest products to forest income

The villages located adjoining the Protected Areas boundary depend upon forest resources for their livelihood in various levels. Forest products play a critical role in generating income and employment and RF, and 38% reported as only from the PA, their forest products source where the rest 19% mentioned RF as their sole source of collection. The major forest products reported by households include firewood, medicinal plants, bamboo shoot honey and others. According to personal observation, there is widespread selling of handicrafts to tourists by local people at the market which visitors usually go around. Income share from firewood, medicinal plants, bamboo shoot, honey and others are 43%, 36%, 15%, 4%, and 2% among the rural poor community. The collection of forest products like firewood mainly affects wildlife habitat and the ecosystem of the protected forest. Households were found to collect forest products both from the PA as well as from the RF. About 43% of the respondents collected forest products both PA respectively. Firewood is the major source of energy and largest share in forest income, used especially for cooking by local people. Medicine is the second major forest products including utilization of the indigenous medicinal plants, herbs, grasses, trees, and animals by the rural people to mainly treat or cure illness of peoples within the community or outside community and sometimes they are sold outside. Figure 3 indicates different major forest products in the study area.
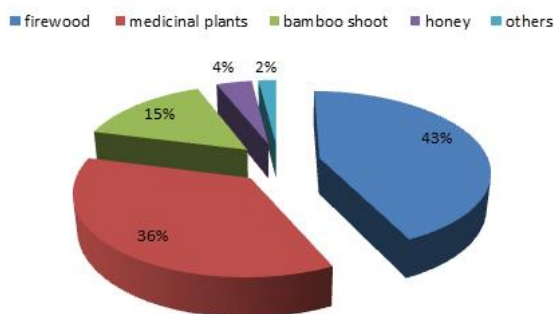
Fig 3 Contribution of different major forest products

4.3 Characteristics of the Respondents

Questionnaires were prepared to ask respondents about their knowledge and attitudes in the study villages (see Table 7). Among the sampled villages, only two villages could be easily accessed by road. Most respondents were male and farmers, and their ages were between 26 and 78 years. Only a few sampled respondents had a high school and University education. Only about 33% of respondents had no agricultural land, while one-fourth held agricultural land of more than 5 acres. Family size is different from one to eight members.

Tab 7 Respondents' knowledge about Popa Mountain Park, Myanmar

Categories	Responses	%
Objective		
Do you know the objectives of the park?	Yes	58
	No	42
If yes, list any objectives that you know.	To conserve forest	81
	To protect medicinal plants	25
	To maintain water sources	12
	To maintain religious site	9
Activities	Yes	47
Are you aware of activities of park managers?	No	53
If yes, list any functions that you know.	Patrolling	42
	Banana replacing	15
	Planting	19
	Infrastructure development	12
	Fire protection	3
	Medicinal plant protection	5
	Boundary demarcation	3
Law		
Do you know the park is protected area by the laws?	Yes	61
	No	39
	Cutting trees	51
If yes, list any prohibited activities that you know.	Poaching	12
	Grazing	10
	Collecting non wood forest products and fuelwoods	25

5. Measurement of Conservation Attitude
Model Specification

A regression model was built to assess and understand factors associated with attitudes toward the protected forest. Local communities living near the PMP expressed their attitudes towards conservation by accepting or rejecting several statements. Unlike many variables such as income and age, it is difficult to perceive attitude as a continuous variable. Therefore, the variables are assumed as a binary variable regarding conservation attitude in the study. The binary nature of the variables suggests that a logit model is more appropriate. Logistic regression analysis was applied to determine which significant factors influence in predicting attitude towards conservation. The logistic regression model representing conservation attitude by the sample households is specified as follows:

$$\ln[Pi/ (1- Pi)]= \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} +\ldots+ \beta_k X_{ki}$$

where subscript i denotes the i-th observation in the sample,

P is the probability of the outcome, β_0 is the intercept term, and β_1, $\beta_2,\ldots, \beta k$ are the coefficients with each explanatory variable X_1, $X_2, \ldots, X_k$. respectively

Explanatory Variables
Data on household's attitude and socioeconomic characteristics were collected through survey process.

Age
Household age is one of the important explanatory variables in influencing conservation attitude. Elderly people may perceive the PMP as a constraint to their livelihood because of culture and traditions. In this study, AGE may have a negative influence on conservation attitude. Alternatively, if younger people are more dependent on forest resources because of prevailing socioeconomic conditions, AGE variable may have positive impact on the effective conservation towards the protected area.

Education
Limited knowledge, information sources and carried activities in protected area lead to a deformed perception on protected areas and the level of acceptance in conservation of the protected area increases with the education level of local people Cristiana Maria Ciocănea et al. 2016). Educated people are expected to support conservation because they may be more aware of the short and long term benefits of conservation.

Benefits from Protected forest
Households living around protected areas usually have positive attitudes towards conservation because they perceive benefits from the protected forest. Perception of the benefits from the protected forest can lead to positive attitudes towards conservation. People who live close to the protected forest with off-farm economic opportunities have positive attitudes because the protected forest provides them with fuel-wood. Thus, it hypothesized that people who were not negatively affected by the benefits from protected forest around the PMP have positive attitudes towards the PMP.

Forest dependency (DEPENDENCY)
The level of dependence of local residents on natural resources (Baral & Heinen, 2007; Marshall, Marshall, Abdulla, & Rouphael, 2010; Sah & Heinen, 2001) and the perceived benefits that PAs provide to local people (Allendorf et al., 2006) may also influence their attitudes and behaviors toward the wildlife in PAs.

Restrictions on the use of forest resources may affect their dependency and livelihood. Therefore the forest dependency has a negative effect on attitude towards conservation of the Park.

Limited access to forest resources (LIMAC)
Since conservation activities place restrictions on the use of forest resources, it is hypothesized that these restrictions may pose problems to households in meeting their forest products needs and therefore influence their attitude. For example, Engel, Marchini, Pont, Machado, and Oliveira (2014) reported that fishermen had negative perceptions toward the Ilha dos Lobos Wildlife Refuge and sea lions (*Otaria flavescens*) in southern Brazil, because they considered the presence of this species as an obstacle to their fisheries activities. Therefore, it is expected that households who perceive that they have limited access to the forest resources due to protected area status are likely to develop a negative attitude.

Landholding (LAND)
Larger landholding size can make people more positive towards conservation. Households with more land are likely to earn more income from their own land and therefore depend less on forest resources. On the other hand landless people who see protection as a limitation to expand or to acquire land may hold a negative attitude towards conservation. Nepal and Weber (1995) show a positive relationship between conservation attitude and landholding size. Thus, landholding size will have a positive impact on conservation attitude according to the expectation.

Length of residency
Long-term inhabitants are more likely to have been adversely affected by restrictions associated with protected area establishment than short-term inhabitants (Newmark et al. 1992). Thus it is hypothesized that length of residency is inversely related to conservation attitude.

6. Results and Discussion
In the study area, about 63 % of respondents held positive attitude toward the PMP conservation program. On average 74% of respondents believed that limited access to forest resources is the most important issue facing their community, about 78%

believe that land scarcity is an important issue in their community, and 24% reported that their families benefit from the protected forest. Since collection of forest products in the PMP is prohibited, few respondents reported that they collected resources from the forest. Results of the model explaining conservation attitudes are given in Table 6.2 and are analyzed in terms of overall significance of the model favorable attitude towards conservation of the Park. This is explained by the fact that younger households with limited economic opportunities are more affected by restrictions associated with the PA management.

This result is in contradiction with other findings which older inhabitants were less likely to support the park than younger households. However, the positive relationship between the level of education and conservation attitude support the findings of Macura(2011).

The variable representing protected forest benefits (BFFPF) is positive relationship with conservation attitude, suggesting that families who realize benefits from the protected forests have more positive attitudes towards the forest. The establishment of

and the impact of each explanatory variable on conservation attitudes. Overall, the majority of the variables had expected signs. Coefficient on LIMAC is statistically significant at p<0.05. The variables AGE and education (EDU) are not statistically significant but show positive relationship with conservation attitude. These results suggest that older people are more likely to accept protected forest has affected communities around it differently. On the other hand, people who live far away from the protected forest without economic alternatives perceive the protected forest primarily as a limitation to agricultural expansion into the forest. Some people are against the protected forest because the government has expropriated their land in order to establish the plantations.

The variable forest dependency (DEPENDENCY) is negatively and statistically significant at P<0.001 suggesting that households with high level of dependency are more likely to hold negative attitudes towards the conservation of the PMP. This is consistent with Nepal and Weber (1995) finding that people who are dependent on protected areas for their livelihood are unlikely to support conservation efforts.

Tab 8 Regression results showing determinants of conservation attitude

Variables	Estimated Coefficient	z	P>|z|	Exp
AGE	0.0020715 (0.0549913)	0.04	0.970	1.002074
EDU	0.250545 (0.4567303)	0.55	0.583	1.284725
BFFPF	0.1069482 (0.6406092)	0.17	0.867	1.112877
DEPENDENCY	-5.488362 *** (1.056311)	-5.20	0.000	.0041346
LIMAC	-1.76856 * (0.8189198)	-2.16	0.031	.1705785
LANDLIM	-0.104927 (0.6201099)	-0.17	0.866	.9003902
RESIDENCY	0.0337403 (0.0565763)	0.60	0.551	1.034316
Constant	3.651519 (2.799097)	1.30	0.192	
	Log likelihood = -46.725695			
	Observations = 174			
	LR chi2(7) = 135.46			
	Prob > chi2 = 0.0000			
	Pseudo R2 = 0.5918			

Legend: * p<.05; ** p<.01; *** p<.001

The variable representing limited access to forest (LIMAC) is negatively related to conservation attitude and significant at 5 %. This suggests that

households who perceive restrictions on the use of the forest as a concern hold a negative attitude. In the face of widespread poverty and limited economic

opportunities in rural areas, it is quite natural that restrictions on the use of forests and other natural resources will lead to a negative attitude. Similar situations have been noted in other protected areas of developing countries. Meihta and Heinen (2001) also found a positive relationship between tourism benefit and households attitude towards conservation in Nepal.

The variable limited land (LANDLIM) shows a negative relationship with conservation attitude towards the Mountain Park. This result suggests that landless households perceive conservation programs as a limitation to meet their subsistence needs and therefore are likely to hold a negative attitude.

The variable residency length (RESIDENCY) is positive but not significant. This suggests that short-term stay is more likely to perceive negative attitudes towards PMP. This is explained by the fact that short-term residents are younger and landless. Therefore, they depend on forest resources to meet their livelihood needs.

7. Conclusion
Information from this study has provided a valuable reference for forest conservation programs that will be effective in reducing deforestation and forest degradation. in Popa Mountain Park, which were strongly influenced by the perceived benefits of conservation to the local communities, exposure to conservation education programs, and conflicts over resource-use with the Park officials. The local people value Mt. Popa because it provides fuel wood, building poles, fruits, honey, bush meat, and the medicinal plants etc. This continued dependence on the Park's resources by the local communities for various forest products will continue to create management problems.

A number of communities living around the Park were found to have negative attitudes toward it, mainly due to the restrictions imposed on resource extraction, land short-age, and inability to effectively resolve conflicts. Although the conservation education programs have been fairly effective in raising awareness among the local communities regarding the importance of conservation, they are often ill-prepared to influence attitudes and the conservation practices of the local people. These programs should cultivate an appreciation among local people of the Park and its resources as a major theme in their plans.

Because negative attitudes toward the conservation of the resources from restricted access to resources in the Park, the principal focus of conservation education programs being carried out should be to establish permanent dialogue between the park managers and local people. These programs should address local concerns, and effectively communicate the resource management objectives and values of the Park. First, these programs need to be made part of a larger strategy to manage the population of local communities living around the Park so as to reduce the demand on the resources. Secondly, the programs must be designed to meet specific and unique needs of the different communities living adjacent to the Park and people within these communities. In this way, people's values and attitudes toward the resources of Park and their conservation would continue to be positive. Lastly, conflict resolution should be made an integral part of these programs. The park officials need to be trained in conflict resolution so as to ensure that there is harmony in the conservation efforts of both the local communities and the park officials.

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