

# Decentralization and people's participation in conservation: a comparative study from the Western Terai of Nepal

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## SUMMARY

Nepal formally embarked on decentralized participatory conservation programmes in 1990. To assess who participates in and benefits from such programmes, stratified random questionnaire surveys of 234 households and interviews with 29 user group chairs were conducted in the buffer zones of two protected areas of the Nepalese Terai: Bardia National Park and Suklaphanta Wildlife Reserve. The Poisson regression shows that gender, education, household affluence, and conservation attitudes were significant predictors of people's participation in decentralized conservation programmes, while family size, ethnicity and resource dependency were not. The benefits of participation outweighed the costs based on respondents' estimates. The performance of grassroots organizations and levels of participation were correlated. Nepal's decentralized participatory conservation has achieved efficiency, relative equity and effectiveness to some extent. Yet the central government should devolve more power to local communities to sustain the achievements as well as to provide more equitable benefits to residents to ensure the effectiveness and sustainability of conservation programmes.

## INTRODUCTION

Decentralization and people's participation have been presented as the *sine qua non* for sustainable conservation. These ideas – quite popular in political science – have become ubiquitous in the lexicon of conservation as well as development fields. After the World Parks Congress in Bali, Indonesia in 1982, various conservation models emphasizing devolution of power to local communities and solicitation of people's participation to manage

protected areas have emerged. The movement gained momentum when the Rio Declaration on Environment and Development stated that 'environmental issues are best handled with the participation of all concerned citizens, at the relevant level.' This shift in conservation policies is reflected in integrated conservation and development programmes (Brandon and Wells 1992), community-based conservation (Western and

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Wright 1994), and joint forest management (Corbridge and Jewitt 1997), which all assume participatory management, and have been promoted by international conservation and development organizations (notably the World Bank) to redress the inefficiency of highly centralized protected areas management in the developing world (Porter and Young 1998). Since they have been in place for some time, the question is, have they redressed ecological, social and economic consequences of more coercive 'fortress and fines' conservation?

The provenance of decentralization in natural resource management dates back to British colonial rule, when local authorities were vested with power to collect revenues and manage resources under their jurisdiction (Agrawal 2001). In recent times, it is not conclusive what factors actuated states to devolve managerial responsibilities to local communities; however, efficiency, equity, effectiveness and sustainability of the programmes, leverage of donors and demands of local people may all explain, in part, such action (Tendler 1997; Crook and Manor 1998; Larson and Ribot 2004). The decentralization of natural resources is more complex than the decentralization of services and infrastructure because the former are sources of revenue to the state as well as livelihoods to local people (Larson 2003). Livelihoods of poor people in developing nations heavily depend on natural resource extraction, and it has been suggested that decentralized conservation policies support livelihoods (Wiggins *et al.* 2004). In light of complexity and competition, mixed results of decentralized conservation programmes are not surprising. Experiments with decentralization are rife in Africa, South America and Asia (Tordoff 1994; Porter and Young 1998; Larson 2003; Antona *et al.* 2004; Padwe 2004). Infused with this global trend, Nepal passed the Decentralization Act in 1982 (Shrestha 1999); however, in practice, most development programmes, and many conservation activities, are still largely centralized (Heinen and Mehta 2000).

Within the decentralized participatory conservation domain, community forests, conservation areas and buffer zones are touted as successful models in Nepal (Heinen and Mehta 1999, 2000; Lachapelle *et al.* 2004). The management of these areas is governed by the 1991 Conservation Area Management Regulations (CAMR), the 1994 Forest Regulations (FR) and the 1996 Buffer Zone Management Regulations (BZMR). Various regulations

instituted user groups (UGs) to facilitate implementation of decentralized policies. The household is a unit of membership in UGs and villagers vote to elect executive members. UGs prepare their own constitutions and draft operational and work plans. Once boundaries are delineated and the plans are approved by governmental authorities, UGs play a direct role in implementing them. Members of UGs can use forest resources in community forests, buffer zones and conservation areas for subsistence and commercial benefits, as prescribed in the management plan. In legislation, the state clearly sought to enhance participation and empowerment of 'backward, poverty stricken, and women users' (HMG 1998); thus, conservationists argue that Nepalese conservation policies are progressive in comparison to the situation in some other developing nations (Heinen and Kattel 1992). The implementation of conservation legislation has been lax over the past decade due to the Maoist insurgency that has taken a toll of more than 13,000 people since 1996 (and especially after 2001); various conservation and development programs came to a halt in the periphery of many protected areas because these were hotbeds for Maoists activities (Baral and Heinen 2006).

Whether the policies endorsing decentralization and participation are meeting conservation goals is a contentious issue. Proponents of decentralized participatory conservation advocate the liberalization of protected areas management (IUCN 1991; Brandon and Wells 1992; Gibson and Marks 1995) while dissenting voices suggest strict protection for conservation interests (Brandon *et al.* 1998; Robinson 1993; Terborgh *et al.* 2002). In light of this debate, a provocative question is: do decentralized participatory conservation programmes strike a balance between social and conservation goals? The answer to the question is imperative for protected area managers because they should acquaint themselves with the potentials and pitfalls that should be tapped and avoided, respectively, while addressing conservation and livelihood issues. Relatively little quantitative data exist on the outcomes of decentralized participatory conservation. Here, we discuss how decentralization and participation programmes are integrated into protected area management in the Western Terai of Nepal. We also explore relationships between socioeconomic variables and the levels of participation, and present results on who participates in, and who

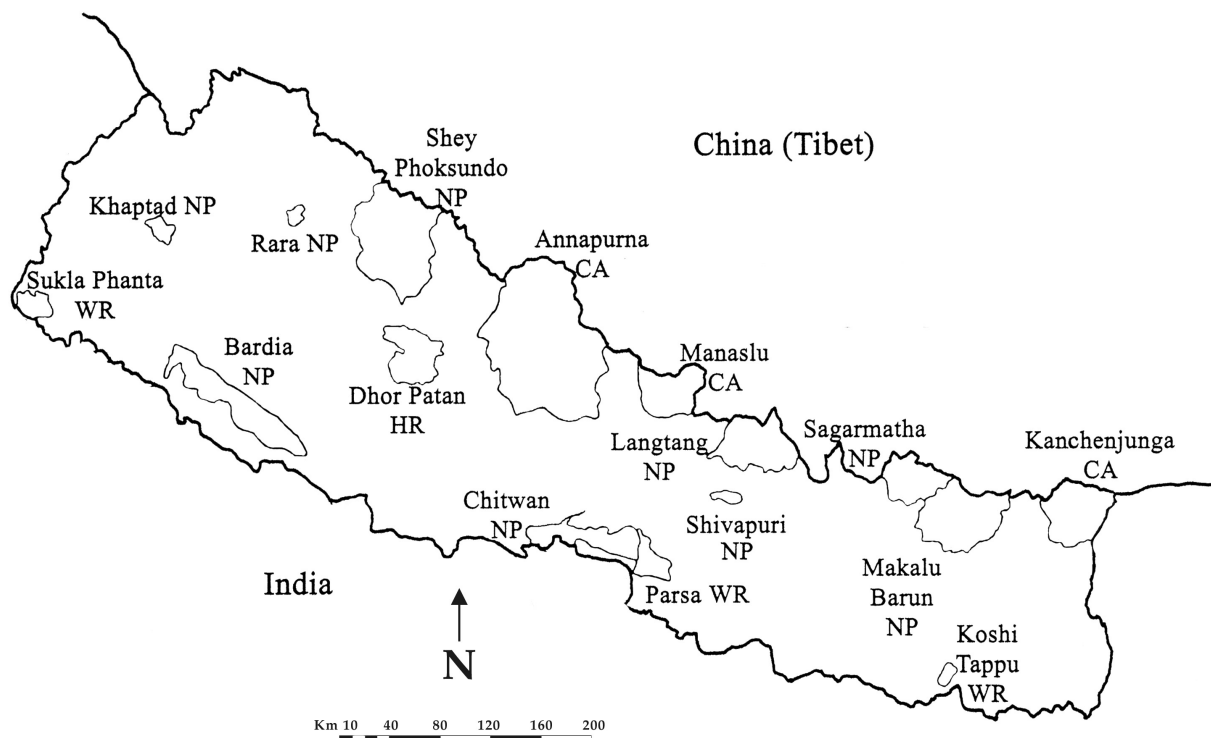
benefits from, conservation programmes, based on an empirical model.

**STUDY AREAS**

The study area comprises two protected areas, Bardia National Park (BNP) and Suklaphanta Wildlife Reserve (SWR), that lie in the mid-western and far-western terai along the southern border of Nepal with India, respectively (Figure 1). There are some differences between the two protected areas, such as a higher population density and ethnic

diversity in SWR, large buffer zone forests in the periphery of BNP and older buffer zone programmes in BNP (Table 1). The region has a sub-tropical monsoonal climate with three distinct seasons: hot-dry (March–June), monsoon (July–October), and cool-dry (November–February).

The main objective of the establishment and management of both BNP and SWR was to conserve critical habitat for the globally endangered Bengal tiger (*Panthera tigris*) and its prey. About 53 and 400 species of mammals and birds, respectively have been recorded in BNP and about 43 mammals and



**Figure 1** Protected areas of Nepal. NP = National Park; WR = Wildlife Reserve; CA = Conservation Area; N = North

**Table 1** Comparison between BNP and SWR

	BNP	SWR
Gazetted	1976	1973
Geographical position	81.46502 E and 28.44479 N	80.22640 E and 28.84955 N
Legal status	National park	Wildlife reserve
IUCN category	II	IV
Area	968 km <sup>2</sup> + 550 km <sup>2</sup> proposed	305 km <sup>2</sup>
Buffer zone	328 km <sup>2</sup> designated in 1996	243 km <sup>2</sup> designated in 2005
Ethnic diversity	Moderate (51% Tharus; 39% Brahman/Chhetri)	High (10% Tharus; 72% Brahman/Chhetri)
Population density	189 per km <sup>2</sup> in 2001	235 per km <sup>2</sup> in 2001
NGOs working in the buffer zone	Many	Few
Number of visitors	5254 (4393 foreigners) in 2003	203 (60 foreigners) in 2003

268 birds have been documented in SWR (DNPWC 2005). These protected areas are also important habitats for megafauna such as Asian elephant (*Elephas maximus*), and re-introduced one-horned rhinoceros (*Rhinoceros unicornis*). Probably the largest herd of swamp deer (*Cervus duvauceli*) in the wild thrives in SWR and it also has the largest population of the endangered Bengal Florican (*Houbaropsis bengalensis*) in Nepal (Baral *et al.* 2003).

The buffer zone of BNP includes 17 village development committees and some 120,000 people live in 11,504 households. The buffer zone of SWR had not been officially declared during the field work (it was gazetted in 2005), but conservation and development activities have been carried out in the proposed buffer zone (Heinen and Rayamajhi 2001). People of different ethnic groups and origins reside in the area. Tharus are an aboriginal group found in Nepal and North India, and are found in scattered settlements in the proximity of forests of the Terai, from the Koshi River in the east to the Mahakali River in the west (Bista 1987; Cox 1990). Many other ethnic groups of mountain origin have settled in the region more recently (Sah and Heinen 2001). Based on the longer history of conservation and development programmes in BNP, and the fact that the areas around SWR are more ethnically mixed and have large populations competing for fewer resources, one general prediction of this study is that residents of BNP would have greater rates of participation, and express more positive attitudes, compared to those living near SWR (e.g. Heinen 1996; Baral and Heinen 2007).

## METHODS

### Household survey

From the archive of the UGs, we stratified sample households by ethnicity (Hindu castes and ethnic groups). A structured questionnaire survey was administered from February to May of 2004 to a sample of 234 randomly selected households (125 in BNP and 109 in SWR) living in the buffer zones. Taking into account the low literacy rate in rural Nepal, questionnaires were written in Nepali, but were asked in Nepali or Tharu, depending on the ethnicity of the household being surveyed. Local words were used and technical jargon was avoided. One adult person ( $\geq 19$  years old) in each household was interviewed at their residence. Generally,

household heads (usually male) were interviewed; in their absence, any member willing to participate was interviewed, resulting in more male (186) than female (48) respondents. Each questionnaire was divided into seven general parts: (1) ethno-religious background, household characteristics (gender, age and occupation of all household members), education level and migration status; (2) economic activities such as landholdings, alternative sources of income and annual cash income; (3) agriculture and animal husbandry; (4) natural resource use; (5) conservation awareness; (6) participation and benefits (memberships, personal benefits, income-generating activities and saving-credit programmes); and (7) assessment of satisfaction towards UGs and wildlife conservation issues. Most of the questions were closed-ended, although some open-ended contingency questions were also included. A sample of survey protocol is available from the authors.

### Survey of UGs

The chairs of 14 and 15 UGs of BNP and SWR, respectively were also interviewed. They were asked about group formation, frequency of meetings, policies on non-timber forest products and their marketing, distribution of benefits, and attitudes towards the Terai Arc Landscape Project (TALP) – an ambitious Nepalese and Indian Government undertaking, sponsored by World Wildlife Fund, to connect 11 protected areas (four in Nepal and seven in India) with habitat corridors (Heinen and Shrestha 2006), and to improve conservation legislation and local development prospects in furtherance of conservation in the region. Whenever an opportunity arose, the first author also did participant observation and content analysis of operational plans, five-year work plans and annual reports of UGs.

### Regression analysis

When the dependent variable has characteristics of count outcomes, a linear regression model can result in inefficient, inconsistent and biased estimates (Long 1997). Therefore, a multivariate Poisson regression model was used to identify conditions under which residents were more likely to participate in integrated conservation and development programmes. The model determines the

probability of a count by a Poisson distribution, where the mean of the distribution is a function of the independent variables. Let  $y$  be a random variable indicating the number of times that an event has occurred, then  $y$  has a Poisson distribution with parameter  $\mu > 0$  if

$$\Pr(y | \mu) = \frac{\exp(-\mu)\mu^y}{y!} \text{ for } y = 0, 1, 2, 3, \dots \quad (1)$$

The following equation is estimated from:

$$\theta = \alpha + \beta_1 \text{ protected areas} + \beta_2 \text{ gender} + \beta_3 \text{ family size} + \beta_4 \text{ ethnicity} + \beta_5 \text{ education} + \beta_6 \text{ household affluence} + \beta_7 \text{ resources use} + \beta_8 \text{ conservation attitudes} + \text{error} \quad (2)$$

where  $\theta$  is the level of participation,  $\alpha$  is constant, and  $\beta_i$  are the coefficients of socioeconomic variables.

#### *The response variable*

We counted household-level participation in activities organized by the park and non-governmental organizations working in the buffer zones. Becoming a member of grassroots institutions, enrolling in and completing training, engaging in income-generating activities, depositing money in saving-credit programmes, and rewarding people for conservation initiatives are some forms of participation. There are many grassroots institutions in buffer zones such as UGs, women's groups, forest groups, etc., and local people are exclusive members. Sewing, painting, vegetable farming, goat keeping and pig raising training are given to local people for income generation. Leadership, conflict resolution and accountancy trainings are given to the executive members of grassroots institutions.

Explanatory variables are:

**Protected areas:** BNP was coded '0' and SWR '1.'

**Gender:** a male respondent was coded '1' and a female '0.' This reflects who is the household head.

**Family size:** number of members 15 years or older living in a household. We did not include children and disabled or senior members (above 70 years) because they cannot participate in conservation and development activities.

**Ethnicity:** Tharus – indigenous people of the Terai – were coded '0,' and immigrants such as Brahman,

Chhetri, Hindu occupational castes and hill tribes were coded '1.'

**Education:** we considered education at the household level by taking percentage of literate members between 15 to 70 years old. Respondents who had at least a year of formal schooling and could read and write were categorized as 'literate = 1,' otherwise 'illiterate = 0.'

**Household affluence:** we used three variables to measure household affluence: landholdings, livestock holdings, and off-farm income. These variables determine the economic status of households because they correspond with three main types of incomes for households in rural areas. We asked respondents how much land they have and what kinds of livestock and how many they rear. The local unit of landholdings was converted into hectares and livestock numbers were standardized into livestock size unit (LSU; e.g. Baral and Heinen 2007). The economic value of land and livestock was calculated based on local prices. We also asked about sources of off-farm income (e.g. jobs in private and public sectors, pensions or remittances from outmigrants), and the total amount the household received from these sources estimated in the most recent year. We summed the three variables and converted the total economic value into USD. This variable followed a log-normal distribution.

**Resource use score:** there were eight types of resources harvested by respondents in BNP and seven types in SWR. Based on estimated harvest frequency of each, resources were assigned importance values. Thus, in BNP eight was assigned to the resource having the highest use frequency, and in SWR seven was assigned to the resource having the highest frequency. The weighted scores of types of resources harvested in a household were summed to calculate the resource use score, which could theoretically range from 0 to 36 in BNP and 0 to 28 in SWR. The higher the score, the more dependent respondents were on resource extraction. Frequency-based 'importance' assignments may not truly reflect the impacts of resource use or scarcity of resources (i.e. some scarce resources may be disproportionately valuable), however, this simplified the analyses.

**Conservation attitudes:** a series of statements about conservation attitudes was presented and respondents were asked to agree or disagree. Statements

covered broad conservation issues, such as the status of forests, custodianship of resources, perceptions of open access resources, wildlife populations and depredation, socioeconomic improvements, access to resources, intra- and intergenerational equity, existence of parks and willingness to contribute to conservation. If the respondent agreed with a positive statement one point was given, otherwise no point was given. The reverse was true for a negative statement. The scores of all statements were summed to derive the attitude score, which could theoretically range from 0 to 11. The higher the attitude score, the more favourable attitude the respondent had towards conservation. A statistical summary of variables under study is given in Table 2.

## RESULTS

### Sample characteristics

The median age of the respondents was 40, and ranged from 19 to 75 years. Although discrimination based on caste and ethnicity was abolished by law, it is practiced socially. Brahman (22%) and Chhetri (32%) rank high and occupational castes (11%; cobbler, ironsmith, tailor, etc.) rank low in the Hindu caste hierarchy. Tharus (32%) are indigenous people of the Terai and hill tribes (3%) include ethnic groups of mountain origin such as Gurung, Magar and Newar. A high proportion (82%) of respondents were immigrants, of which 66% were from the mountains. The literacy rate was 69% and livelihoods depend on subsistence agriculture for most respondents (80%). The average landholding per household was 0.69 ha, and 96% of households had one or more kinds of livestock.

### Participation in programmes

The data fit the Poisson regression model and, of the eight variables considered, five were statistically significant ( $LR \chi^2_8 = 67.17, p < 0.01$ ). As expected, respondents in BNP participated in more activities than those of SWR ( $p < 0.01$ ). The encouraging finding was that women were more likely to participate than men. The level of participation showed a significant positive correlation with level of education. Respondents who were economically better-off were more likely to participate than those who were poorer. Similarly, respondents who held more favourable attitudes towards conservation were more likely to participate than those who held less favourable conservation attitudes. Although not statistically significant, a positive coefficient of ethnicity ( $p = 0.542$ ) suggests that immigrants were more likely to participate in conservation programmes. A negative coefficient of family size ( $p = 0.870$ ) was not expected, nor was the result that resource dependency of households did not explain significant variations in the level of participation ( $p = 0.513$ ).

### Benefits of resource management

Of 14 UGs in BNP, 12 had parcels of forests to manage, however, only one UG had any forest in SWR (a 4-ha tract). A total of 841 ha of buffer zone forests was managed by 14 surveyed UGs in BNP, and the average size of forest parcels was  $70 \pm 56$  ha (range 4–150 ha). Although local people harvested eight and seven types of resources in BNP and SWR, respectively; the economic value of only three important resources – firewood, thatch and timber

**Table 2** Mean, standard deviation, and Mann-Whitney test of studied variables in the two protected areas

Respondents' socioeconomic status	BNP	SWR	Statistics
Gender (Female = 0)	0.82 ± 0.32	0.76 ± 0.43	$z = 1.18, p > 0.10$
Family size (members > 15 years)	4.29 ± 2.42	4.73 ± 1.90	$z = -2.52, p < 0.05$
Ethnicity (Tharus = 0)	0.49 ± 0.50	0.90 ± 0.30	$z = -6.70, p < 0.01$
Education (% literate)	60.87 ± 29.58	76.29 ± 22.59	$z = -4.12, p < 0.01$
Household affluence (log transformed)	9.72 ± 0.91	10.92 ± 1.09	$z = -8.27, p < 0.01$
Landholdings (ha)	0.68 ± 0.7	0.71 ± 0.7	$z = -0.80, p > 0.10$
Livestock holdings (LSU)	4.4 ± 4.7	4.0 ± 2.1	$z = -0.44, p > 0.10$
Annual cash income (US\$)	444 ± 386	664 ± 544	$z = -2.94, p < 0.05$
Resource use score	21.95 ± 7.10	12.84 ± 5.86	$z = 9.42, p < 0.01$
Conservation attitude score	8.40 ± 1.44	7.43 ± 1.66	$z = 3.24, p < 0.01$
Participation	2.06 ± 1.83	1.32 ± 1.17	$z = 2.94, p < 0.01$

– was calculated because they are traded in the local market and thus productive use values can be estimated. By participating in decentralized conservation programmes, local people of BNP had more direct benefits than those of SWR ( $z = 6.49$ ,  $p < 0.01$ ; Table 3). At the household level, the average total economic value of three resources harvested per year was US\$45.59 ± 47.05 and 15.04 ± 13.96 for BNP and SWR, respectively. In both areas, the benefit derived from firewood was highest. In addition, indirect benefits of participation in formal conservation programmes were skill development, and thus an expected increase in confidence and self-worth.

### Institutional strengthening

We considered election of members, demand fulfilment and satisfaction of members, representation of women and minority members, pursuit of operational and working plans, and awareness about legislation and regulations as indicators of institutional strengthening. Based on these indicators, grassroots organizations in BNP were more strengthened than those of SWR (Table 4). When asked which institutional arrangement would be most efficient to manage resources in a sustainable manner, a high proportion (64% in BNP and 60%

in SWR) of UG chairs responded that local people were the most effective institution. About 21% and 33% of UG chairs of BNP and SWR, respectively, considered government agencies as the most effective institution. Some UG chairs (14% in BNP and 7% in SWR) emphasized coordinated efforts of government agencies and local people for sustainable management of resources in the region.

In the buffer zones, knowledge about the Terai Arc Landscape Project (TALP) was more pronounced in BNP than in SWR. All UG chairs of BNP were familiar with TALP while only 60% of those from SWR were familiar. Respondents ranked the satisfaction level of overall TALP activities in the area. In BNP, 21% were highly satisfied, 50% moderately satisfied and 29% were not satisfied at all. An overwhelming proportion (93%) of respondents was not satisfied and 7% moderately satisfied with TALP in SWR.

### DISCUSSION

Decentralized participatory conservation programmes are more successful in BNP than in SWR. Our results suggest that grassroots organizations in BNP are more strengthened in comparison to SWR. The active engagement of grassroots organizations in executing programmes has solicited more

**Table 3** Mean and standard deviation of quantity (firewood and thatch in kg, and timber in cubic feet) and economic value (in US\$) of resources harvested per household per year

Natural resources	BNP		SWR	
	Quantity	Economic value	Quantity	Economic value
Firewood	951 ± 1143	31.71 ± 38.08	565 ± 1486	11.05 ± 12.21
Thatch	336 ± 338	12.59 ± 12.66	235 ± 240	8.79 ± 9.00
Timber	10 ± 11	29.71 ± 32.85	–	–
Average total economic value	45.59 ± 47.05		15.04 ± 13.96	

**Table 4** Indicators of institutional strengthening between the two protected areas

	BNP	SWR
Mode of formation of UG	71% consensus; 29% election	87% consensus; 13% election
Female members on executive committees	in all UGs	only in 3 UGs
Representation of underprivileged groups	High	Low
Five-year work plan	all UGs	60% of UGs
Demand fulfilment	Yes – 50%	Yes – 40%
Are people satisfied with UGs?	Yes – 82%	Yes – 71%
Amendments in regulations	Yes – 64%	Yes – 20%

favourable conservation attitudes and participation in BNP than in SWR. There are higher direct economic benefits from resource extraction and more participation of women in BNP than in SWR. The buffer zone policies and NGO programmes are much more firmly in place, over much longer periods of time, in BNP compared to SWR. BNP also has a longer and more extensive history of socioeconomic intervention and its UGs are measurably more functional. Therefore, we argue that conservation and development agencies should first strengthen capacities of grassroots organizations, if sustainability of programmes is to be ensured by wider participation and favourable attitudes of local communities.

Three broad reasons that hinder popular participation in resource management are: vulnerability (lack of private resources), inferiority (arising due to discrimination based on caste, gender and education) and the potential for corruption, especially due to lack of funding transparency (Lachapelle *et al.* 2004). Most respondents (> 90%) have parcels of land and some livestock for subsistence agriculture, and this is complemented by market-based off-farm income in 23% of households. Since those households have access to private resources, they are less vulnerable to restrictions imposed by conservation agencies. The socioeconomic standing among ethnic groups is not significantly different.

The BZMR has made it mandatory to include women and marginalized communities in UGs (Heinen and Shrestha 2006). Although their level of education is lower than other groups, their representation on UGs is encouraging, especially taking into account the gender and caste discrimination prevalent in these areas. Since many NGOs targeted underprivileged Tharus for income generation activities, saving-credit programmes, and training, they benefit more from conservation interventions ( $X^2_1 = 3.95$ ,  $p < 0.05$ ). Contrary to general belief, ethnic heterogeneity does not undermine participation if good institutions are in place (Varughese and Ostrom 2001), although it makes it more difficult (Heinen 1996). However, there is a caveat of participatory exclusion of women due to ignorance of gender equity or usurpation of power by local despots (Agrawal B 2001; Beall 2005). The progressive conservation legislation of Nepal explicitly addressed these issues and thus fostered wider participation. The management plan of Annapurna Conservation

Area, for example, has set the goal of increasing women members up to 33% in its conservation area management committees (ACAP 1997). This is likely in the case of buffer zone management in the future in Nepal owing to active participation of women.

Social and economic considerations influence the level of participation. In our study, gender, education, household affluence and conservation attitudes are significant predictors of whether people participate, and they are positively correlated with participation. Greater involvement of women in communities leads to wider participation in general (Lise 2000). This is because women constitute about the half of the total population but are more involved in resource extraction, so their exclusion can seriously undermine conservation initiatives. Mixed results on the level of education and likelihood of participation have been reported. Agrawal and Gupta (2005) found a negative correlation between education and participation while Lise (2000) found a positive correlation. The level of education influences attitudes towards conservation and, when people have favourable conservation attitudes, they are more likely to participate (Robertson and Lawes 2005). The negative relation between education and participation could be due to unmet expectations of educated people in conservation programmes. Similarly, wealthier people are more likely to participate in conservation activities (Agrawal and Gupta 2005), but poorer people are more likely to participate in public work schemes (Teklu and Asefa 1999). The participation in conservation programmes is unpaid; therefore, the preference of poor people for wage earning in developmental activities is expected.

Contrary to our expectations, household size and ethnicity did not explain significant variations in the likelihood of participation. The Spearman correlation results showed that family size had a significant positive correlation with annual cash income ( $r = 0.39$ ) and livestock holdings ( $r = 0.51$ ;  $p < 0.01$ ), and the sum of these variables constitutes household affluence. Since household affluence was a significant predictor of participation, it may have masked the influence of household size. In addition, the participating family size of Tharus (4.65) did not differ from those of immigrants (4.41;  $z = 0.03$ ;  $p > 0.10$ ). Although not significant, the negative coefficient of family size in the regression model was unexpected. On average, Tharus

had participated in 1.75 activities and immigrants in 1.69, which was not significantly different ( $p > 0.10$ ). Yet the level of education among Tharus was significantly lower than other groups ( $X^2_4 = 19.04$ ;  $p < 0.01$ ). Since education is significant while ethnicity is not, it is possible that education could have suppressed the effects of ethnicity. Education helps to secure off-farm jobs and the household income increases in turn. Tharus are earning significantly lower cash income than immigrants ( $p < 0.01$ ). Since immigrants are better educated than ethnic Tharus, they tend to hold powerful positions in many grassroots organizations.

A high dependency on natural resources, if they are not open-access, serves as an incentive to participate in their conservation (Lise 2000). This is true, as exploitation of resources jeopardizes livelihoods because many rural households heavily depend on natural resources. The insignificant result of resource dependency on participation in our study could be explained in light of two variables: household affluence and ethnicity. The dependency on resources decreased with household affluence ( $r = -0.36$ ;  $p < 0.01$ ). However, Tharus were more dependent than immigrants ( $z = 7.83$ ;  $p < 0.01$ ), although there was no significant difference in amount of land and livestock holdings between the two groups. Household affluence could have masked the effects of the resource dependency variable on participation.

There are benefits and costs of living in the periphery of the parks. The most significant benefits at the local level are consumptive (firewood, timber, food, herbs, medicines, construction materials, etc.) and the ability to earn income from recreation/tourism (Wells 1992). Costs include: loss of crops and livestock to wildlife, injury and death, loss of access rights, and time and resources spent to guard wildlife. As per benefit–cost analysis, benefits should outweigh costs to entice people to support conservation and participate in UG activities. In conservation programmes, the notable cost of participation is investment of time, while direct and indirect benefits are many. The inequitable distribution of costs and benefits in collective actions results in negative attitudes towards such programmes (Parry and Campbell 1992) that in turn hamper wider participation (Agrawal B 2001).

The benefits derived by local people from conservation programmes are substantial. The median

benefit at the household level from the harvest of three main resources was US\$39, which equalled 16% of the per capita income (US\$240) of Nepal in 2004. The potential to increase benefits is tremendous. The Nepalese terai harbours a wide variety of non-timber forest products (NTFPs) and their trade is profitable. Yet none of the UGs in our study areas have developed plans for NTFPs marketing. The BZMR is silent about whether UGs can extract NTFPs from buffer zone forests for commercial purposes; however, UGs could take the lead and propose necessary amendments. If the management committees endorse NTFP management plans, the contribution to household income would likely increase. When local people bear costs of participation but benefits accrue elsewhere, it results in a ‘*participatory corvee*’ (Ribot 1995), an iniquitous situation that discourages participation. In the study areas, both rich and poor are contributing to the management of buffer zones and are reaping benefits. However, poor people are net losers in participatory common pool resource management elsewhere (Kumar 2002). Social benefit-cost analysis at the household level provides more insights into impacts of decentralization on equity and economic empowerment. Participation leads to empowerment of local people if the social costs are minimized and social benefits are maximized across the income spectrum.

Decentralized participatory conservation draws heavily from two principles: subsidiarity and collective action. The subsidiarity principle advocates that the decision-making power for tasks more appropriately undertaken at the local level should be devolved to local communities without adverse effects to central policies (Krishna 2003). The collective action principle asserts that accountable mobilization of resources by local communities prevents free-riding and fosters sustainability (Ostrom 1990). Nepal’s governmental efforts to capitalize on benefits of the common property regime (CPR) are reflected in progressive legislation and buffer zone management. Hence, in some areas, formerly degraded buffer zone forests are regenerating so well that local people have started harvesting resources, and wildlife populations have rebounded (Baral and Heinen 2007). We have encountered endangered wildlife in buffer zones and quantitative assessment of forest status was good (Timilsina *et al.* 2007). This claim is supported by the finding that users tend to reduce extraction

of resources under CPR (Edmonds 2002). Evidence from various studies thus suggests that management of buffer zone forests by local communities provides socioeconomic and ecological buffers to the park. The adjunct habitat in many areas is protected without accruing administrative costs to the park management. The provision of earmarking of 30–50% of revenue generated by the parks to local development, as required in buffer zone legislation (Heinen and Mehta 2000), has arguably improved living standards in areas that have been studied. Societal benefits of the scheme are access to roads, safe drinking water, health care and schools. The synergistic collaborative management of natural resources by the government and local communities has thus begun to curb the problem of open access, free-riding and inefficiency to some degree that, in turn, did not promote sustainability.

## CONCLUSIONS

Decentralized participatory conservation in the buffer zones of lowland Nepal is considered a synergistic win-win strategy, because the state is relieved of the administrative and financial burdens of managing adjunct habitats, while residents benefit from sustainable resource extraction. The Maoist people's war over the past decade, undermined many conservation achievements (Baral and Heinen 2006), but recent developments to bring rebels into mainstream politics inspires optimism for the future. The likelihood of success of decentralized conservation programmes increases if marginalized people (women, minorities, poor, etc.) are brought into mainstream participation. Thus, the role of the central government should be to forge legislation that explicitly provides a forum for participation. The implementing agencies should prioritize strengthening grassroots organizations so that the intention of the law will transpire into practice at the local level. So far, the Nepalese

experience suggests that collaboration of the central government and local communities with well designed programmes can enhance effectiveness, efficiency and equity in managing buffer zones around protected areas and thus succour sustainable development of peripheral communities. The demand of SWR residents to hand over the 300-m periphery of the reserve to UGs highlights the promise of decentralized participatory conservation. The synergistic outcomes of collaboration have paved the way to some degree towards sustainable conservation; however, more power should be devolved to local communities to retain achievements and face new challenges and ongoing monitoring is essential. Decentralized participatory conservation programmes are not a panacea for all conservation problems, but if implemented cautiously they may help to bridge the rift between conservation and sustainable development objectives.

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## REFERENCES

- ACAP. *Annapurna Conservation Area: management plan*. Kathmandu, Nepal: King Mahendra Trust for Nature Conservation; 1997
- Agrawal A. The regulatory community: decentralization and the environment in the Van Panchayat (Forest Councils) of Kumaon, India. *Mountain Research and Development* 2001;21(3):208–11
- Agrawal A and Gupta K. Decentralization and participation: the governance of common pool resources

- in Nepal's Terai. *World Development* 2005;33(7): 1101–14
- Agrawal B. Participatory exclusions, community forestry, and gender: an analysis for South Asia and a conceptual framework. *World Development* 2001; 29(10):1623–48
- Antona M, Bienabe EM, Salles J-M, Pechard G, Aubert S and Ratsimbarison R. Rights transfer in Madagascar biodiversity policies: achievements and significance. *Environment and Development Economics* 2004;9:825–47
- Baral N and Heinen JT. Resource use, conservation attitudes management intervention and park–people relations in the Western Terai landscape of Nepal. *Environmental Conservation* 2007;34(1): 64–72
- Baral N and Heinen JT. The Maoists people's war and conservation in Nepal. *Politics and the Life Sciences* 2006;24(1–2):2–11
- Baral N, Timilsina N and Tamang B. Status of Bengal Florican *Houbaropsis bengalensis* in Nepal. *Forktail* 2003;19:51–5
- Beall J. Decentralizing government and decentering gender: lessons from local government reform in South Africa. *Politics and Society* 2005;33(2):253–76
- Bista DB. *People of Nepal*. 5th ed. Kathmandu, Nepal: Ratna Pustak Bhandar; 1987
- Brandon K and Wells M. Planning for people and parks. *World Development* 1992;20:357–70
- Brandon K, Redford KH and Sanderson SE (eds). *Parks in peril: people, politics and protected areas*. Washington DC: The Nature Conservancy Press and Island Press; 1998
- Corbridge S and Jewitt S. From forest struggles to forest citizens? Joint Forest Management in the unquiet woods of India's Jharkhanda. *Environment and Planning* 1997;29(12):2145–64
- Cox T. Land rights and ethnic conflict in Nepal. *Economic and Political Weekly* 1990;16–23:1318–20
- Crook R and Manor J. *Democracy and decentralization in South Asia and West Africa: participation, accountability and performance*. Cambridge, UK: Cambridge University Press; 1998
- DNPWC. *Revenue generation in protected areas*. The Department of National Parks and Wildlife Conservation, Kathmandu, Nepal. <http://www.dnpwc.gov.np/> (accessed on February 9, 2005)
- Edmonds EV. Government-initiated community resource management and local resource extraction from Nepal's forests. *Journal of Development Economics* 2002;68:89–115
- Gibson CK and Marks SA. Transforming rural hunters into conservationists: an assessment of community-based wildlife management program in Africa. *World Development* 1995;23(6):941–57
- Heinen JT. Human behavior, incentives, and protected area management. *Conservation Biology* 1996;10:681–4
- Heinen JT and Kattel B. Parks, people, and conservation: a review of management issues in Nepal's protected areas. *Population and Environment* 1992; 14(1):49–84
- Heinen JT and Mehta JN. Conceptual and legal issues in the designation and management of conservation areas in Nepal. *Environmental Conservation* 1999;26(1):21–9
- Heinen JT and Mehta JN. Emerging issues in legal and procedural aspects of buffer zone management with case studies from Nepal. *Journal of Environment and Development* 2000;9(1):45–67
- Heinen JT and Rayamajhi S. On the use of goal-oriented project planning for protected area management in Nepal. *Environmental Practice* 2001;3:227–36
- Heinen JT and Shrestha S. Evolving policies for conservation: an historical profile of the protected area system of Nepal. *Journal of Environmental Planning and Management* 2006;49(1):41–58
- HMG. *The Ninth Plan (1997–2002)*. Kathmandu, Nepal: His Majesty's Government of Nepal, National Planning Commission; 1998
- IUCN. *Caring for the Earth: a strategy for sustainable living*. Gland, Switzerland: IUCN/UNEP/WWF; 1991
- Krishna A. Partnerships between local governments and community-based organizations: exploring the scope for synergy. *Public Administration and Development* 2003;23:361–71
- Kumar S. Does 'participation' in common pool resource management help the poor? A social cost-benefit analysis of joint forest management in Jharkhand, India. *World Development* 2002;30(5): 763–82
- Lachapelle PR, Smith PD and McCool SF. Access to power or genuine empowerment? An analysis of three community forest groups in Nepal. *Human Ecology Review* 2004;11(1):1–12
- Larson A and Ribot JC (eds). Democratic decentralization through a natural resource lens: experience from Africa, Asia and Latin America. *European Journal of Development Research* 2004;16(1):1–25
- Larson AM. Decentralization and forest management in Latin America: towards a working model. *Public Administration and Development* 2003;23:211–26
- Lise W. Factors influencing people's participation in forest management in India. *Ecological Economics* 2000;34:379–92
- Long JS. *Regression models for categorical and limited dependent variables*. California: Sage; 1997
- Ostrom E. *Governing the commons: the evolution of institutions for collective action*. Cambridge, UK: Cambridge University Press; 1990

- Padwe J. Participatory conservation in the Condor Bioreserve, Ecuador: representations, decision processes, and underlying assumptions. *Journal of Sustainable Forestry* 2004;18(2-3):107-37
- Parry D and Campbell B. Attitudes of rural communities to animal wildlife and its utilization in Chobe enclave and Mababe depression, Botswana. *Environmental Conservation* 1992;19(3):245-52
- Porter G and Young E. Decentralized environmental management and popular participation in coastal Ghana. *Journal of International Development* 1998; 10:515-26
- Ribot J. From exclusion to participation: turning Senegal's forestry policy around? *World Development* 1995;23(9):1587-99
- Robertson J and Lawes JM. User perceptions of conservation and participatory management of iGxalingenwa forest, South Africa. *Environmental Conservation* 2005;32(1):64-75
- Robinson J. The limits to caring: sustainable living and the loss of biodiversity. *Conservation Biology* 1993; 7(1):20-8
- Sah JP and Heinen JT. Wetland resource use and conservation attitudes among indigenous and migrant peoples in Ghodaghodi Lake area, Nepal. *Environmental Conservation* 2001;28(4):345-56
- Shrestha TN. *The implementation of decentralization scheme in Nepal*. Kathmandu, Nepal: Joshi Publications; 1999
- Teklu T and Asefa S. Who participates in labor-intensive public works in Sub-Saharan Africa? Evidence from rural Botswana and Kenya. *World Development* 1999;27(2):431-8
- Tendler J. *Good government in the Tropics*. Baltimore MA: Johns Hopkins University Press; 1997
- Terborgh J, van Schaik C, Davenport L and Rao M (eds). *Making parks work: strategies for preserving tropical nature*. Washington DC: Island Press; 2002
- Timilsina N, Ross MS and Heinen JT. A community analysis Sal (*Shorea robusta*) forests in the Western Terai of Nepal. *Forest Ecology and Management* 2007;241(1-3):223-34
- Tordoff W. Decentralization: comparative experience in commonwealth Africa. *Journal of Modern African Studies* 1994;32(4):555-80
- Varughese G and Ostrom E. The contested role of heterogeneity in collective action: some evidence from community forestry in Nepal. *World Development* 2001;29(5):747-65
- Wells P. Biodiversity conservation, affluence and poverty: mismatched costs and benefits and efforts to remedy them. *Ambio* 1992;21(3):237-43
- Western D and Wright RM (eds). *Natural connections: perspectives in community-based conservation*. Washington DC: Island Press; 1994
- Wiggins S, Marfo K and Anchirinah V. Protecting the forests of the people? Environmental politics and livelihoods in the forest margins of Southern Ghana. *World Development* 2004;32(11): 1939-55