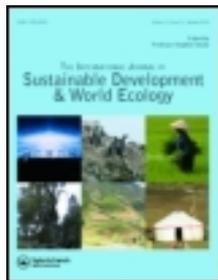


This article was downloaded by: [Robert Horwich]

On: 29 July 2013, At: 07:13

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



International Journal of Sustainable Development & World Ecology

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tsdw20>

Motivations of the community forest protection forces of the Manas Biosphere Reserve in Assam, India

Teri D. Allendorf^a, Raju Das^b, Arnab Bose^b, Bubon Ray^b, Kingchuk D. Chaudhuri^b, Sophie Brock^c & Robert H. Horwich^c

^a Department of Forest and Wildlife Ecology, University of Wisconsin, Madison, WI, 53560, USA

^b Nature's Foster, P.B. No. 41, Shastri Rd, Bongaigaon, Assam, PIN 783 380, India

^c Community Conservation, 50542 One Quiet Lane, Gays Mills, WI, 54631, USA

Published online: 23 Jul 2013.

To cite this article: International Journal of Sustainable Development & World Ecology (2013): Motivations of the community forest protection forces of the Manas Biosphere Reserve in Assam, India, International Journal of Sustainable Development & World Ecology, DOI: 10.1080/13504509.2013.816890

To link to this article: <http://dx.doi.org/10.1080/13504509.2013.816890>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

Motivations of the community forest protection forces of the Manas Biosphere Reserve in Assam, India

Teri D. Allendorf^{a*}, Raju Das^b, Arnab Bose^b, Bubon Ray^b, Kingchuk D. Chaudhuri^b, Sophie Brock^c and Robert H. Horwich^c

^aDepartment of Forest and Wildlife Ecology, University of Wisconsin, Madison, WI 53560, USA; ^bNature's Foster, P.B. No. 41, Shastri Rd., Bongaigaon, Assam, PIN 783 380, India; ^cCommunity Conservation, 50542 One Quiet Lane, Gays Mills, WI 54631, USA

(Received 1 March 2013; final version received 12 June 2013)

Conservation with a high level of community involvement is proving to be an effective way to conserve forests with benefits for livelihoods and biodiversity. However, people's motivations to participate in conservation in developing countries are not well studied or understood. One example of a highly successful community conservation program is the Golden Langur Conservation Project (GLCP) in the Manas Biosphere Reserve. The project was initiated in 1998 to protect the endangered golden langur (*Trachypithecus geei*) and its forested habitat. By 2005, community forest protection forces had been created and were successfully protecting the forest. They have been effective in stopping illegal poachers and confiscating illegally taken timber and wildlife. The objectives of this study are to describe the community forest guards' motivations to participate in the program, and their perceptions of the project. Results show that these community-based guardians are motivated to participate by multiple factors: conservation, social benefits, and economic opportunities. Conservation of forests and wildlife seem to play the primary role in motivating guards to participate in conserving the forest. However, economic benefits and social benefits also play important roles.

Keywords: community; conservation; participation; Assam; India; the Manas Biosphere Reserve; motivation; developing countries

Introduction

The world's ecosystems are rapidly degrading with a high rate of deforestation in many areas (Schmitt et al. 2009; Persha et al. 2011) and a continuous loss of biodiversity (Schipper et al. 2008). This worldwide damage occurs despite the rise in conservation spending (Brockington et al. 2008), indicating that current conservation strategies have generally been failing to curb deforestation throughout the world (Schmitt et al. 2009; Horwich et al. 2011, 2012). While there are some successes of large-scale protected areas, the record has been mixed (Brockington et al. 2008; Dowie 2009) and the literature is filled with hypothetical solutions to these problems (Turner et al. 2007; Milner-Gullard et al. 2010).

However, there is evidence that one strategy is emerging as a solid solution to the problem of environmental degradation that is both cost effective and can have regional effects on large landscapes (Turner et al. 2007; Milner-Gullard et al. 2010). Conservation of forests with a high level of community involvement is proving to be an effective way to conserve forests with benefits for livelihoods and biodiversity (Horwich & Lyon 2007; Dowie 2009; Persha et al. 2011).

One example of a highly successful community conservation program is the Golden Langur Conservation Project (GLCP) in the Manas Biosphere Reserve (26° 30' 0" N,

91° 51' 0" E) (Figure 1), which contains the main continuous habitat range of the golden langur in India, as well as a high biodiversity of other vertebrates. Since the late 1980s, western Assam has suffered massive illegal log cutting and smuggling resulting in a 50% forest loss (Horwich et al. 2010). These illegal activities occurred in an open access atmosphere due to militant activities that targeted the Assam Department of Environment and Forests staff and prevented them from carrying out their duties to protect and manage the forest.

The project was initiated in 1998 to protect the endangered golden langur (*Trachypithecus geei*) and its forested habitat. It targeted the entire Indian range of the golden langur, including the Manas Biosphere Reserve (285,000 ha), to effect regional change through stimulating community conservation contagion (Horwich et al. 2012) using methods tried internationally elsewhere (Horwich & Lyon 2007; Horwich et al. 2010, 2012). Strategies included community meetings, initiating forest committees and Self Help Groups, formal seminars with non-governmental organizations (NGOs), government agencies and communities, and large celebratory events for the Manas Biosphere Reserve that attracted from 5000 to 35,000 participants.

In 2005, the late Rajen Islari of the NGO Green Forest Conservation, an original member of the GLCP, worked

*Corresponding author. Email: teriallendorf@yahoo.com

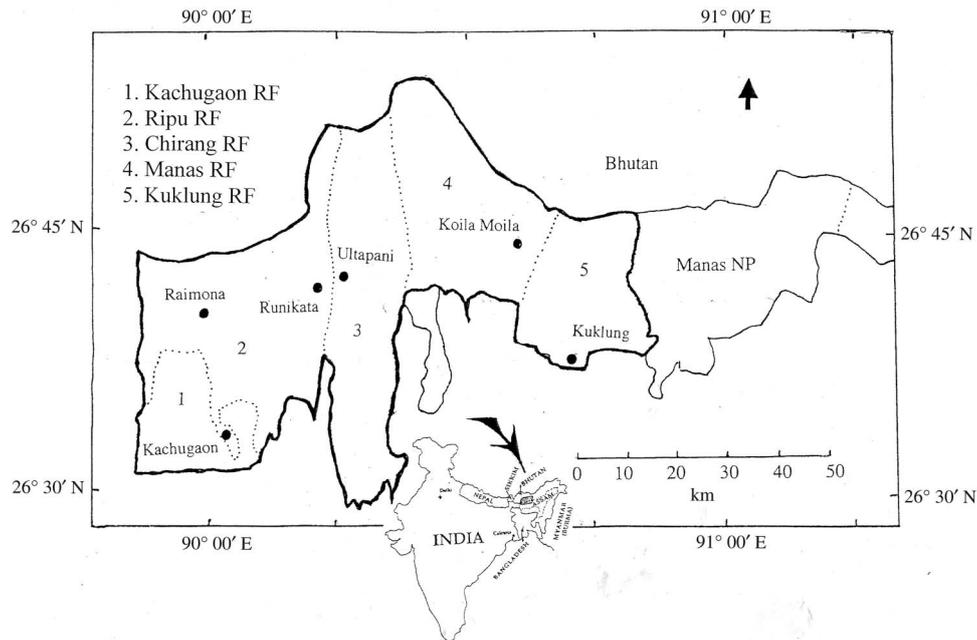


Figure 1. Map of the western reserve forests of the Manas Biosphere Reserve indicating the reserve forests protected by the forest protection forces and the villages where they are based.

with Kampa Borgoyari, the Minister of Environment of the newly formed Bodoland Territorial Council, to create the initial Bodoland Forest Protection Force. This force was composed of 100 villagers to protect Kachugaon and Ripu Reserve Forests (RFs), the two western-most RFs of the Manas Biosphere Reserve (Figure 1). As a result of the conservation contagion generated by the project, an additional 17 community groups developed their own forest protection forces to protect most of the remainder of the 285,000 hectares of the Manas Biosphere Reserve.

As a result of the community protection, in coordination with the Bodoland Territorial Council and the Assam Department of Environment and Forests, nearly all illegal logging has been stopped and the Indian golden langur population has increased from 1500 in 1997 to over 5600 individuals (Horwich et al. 2012, 2013) with indications of steady or increasing population of tigers (India, Ministry of Environment and Forests 2011) and elephants (Ghosh 2008). These successes have been internationally recognized and the listing of the Manas Biosphere Reserve by UNESCO in 1992 as a world heritage site ‘in danger’ due to heavy poaching and terrorist activities was lifted in 2011 in large part due to the activities of the community forest protection forces.

While the history and accomplishments of the forest protection forces in the Manas Biosphere Reserve are well documented (Horwich et al. 2010, 2012, 2013), the motivations of the people who made the project successful have not been considered. In general, the reasons that people participate in conservation in developing countries are not well studied or understood. Most conservation projects focus on providing extrinsic benefits for communities as a way to motivate people to participate in conservation.

These benefits range from more traditional mechanisms, such as forest extraction or income from tourism, to newer mechanisms, such as payments for ecosystem services. The assumption is that these types of benefits are the primary ones that motivate communities to conserve protected areas. In this study, our objectives are to describe the community forest guards’ motivations to participate in the program and their perceptions of the project.

Survey methods

Three of the authors, Bose, Das, and Ray, surveyed 99 members of the four community-based organizations that patrol within the western Manas Biosphere Reserve (see Figure 1). Approximately 40–50% of the members of each of the forest protection forces were interviewed. The Green Forest Conservation forest protection force protects Kachugaon and Ripu RFs. The New Horizon force protects the Manas RF. The Biodiversity Conservation Society force protects Chirang RF. The Raigajli Ecotourism and Social Welfare Society force protects Kuklung RF.

The questionnaire was divided into six parts and consisted of open-ended questions concerning: (1) socioeconomic background, (2) environmental knowledge, (3) project responsibilities and skills, (4) motivations to participate and benefits, and (5) project perceptions. Respondents could give multiple responses to open-ended questions. Thus, responses do not equal 100%. Five practice surveys were conducted and revisions made to the questionnaire. Each person was interviewed in an isolated area at their home or workplace out of hearing range of other people. The interviewers made efforts not to lead the

respondents and surveys were carried out by all three interviewers in the same manner each time. If a question was not understood, the question was stated in an alternative way without leading.

Results

Socioeconomic background

The mean age of the respondents was 25.4 years (± 5.1) (Table 1). Most respondents came from farming backgrounds and had fathers who were farmers. Nearly half of them were married. Almost all were from scheduled tribes, mainly Bodo, and about two-thirds are Hindu and the rest were Christian. They were relatively well-educated and wealthy: 86% had at least 10 years of education and half own more than 10 bigha of land.

Environmental knowledge

Respondents said they can identify an average of 34 plant species, 23 mammal species, and 26 bird species (Table 2). Nearly all of them said they use wild herbs for medicinal purposes and can identify an average of eight species of medicinal plants. One-third said they had participated in hunting and some had experience tracking animals.

When asked what benefits the forest provides, the majority listed water and oxygen. Other benefits included extraction of fuelwood and non-timber forest products (NTFPs), esthetics, and tourism. In response to the problems of the forest, they cited conflicts with wildlife, including crop raiding and livestock depredation by wildlife,

Table 2. Community forest guards' environmental knowledge.

| Variable | % (unless noted) ($n = 99$) |
|--|-------------------------------|
| How many plants do you know by name? (Mean \pm SD) | 33 \pm 18 (range 10–100) |
| How many mammals do you know by name? (Mean \pm SD) | 23 \pm 12 (range 5–70) |
| How many birds do you know by name? (Mean \pm SD) | 26 \pm 15 (range 5–100) |
| How many medicinal plants do you know by name? (Mean \pm SD) | 8 \pm 6 (range 2–50) |
| Do you use wild herbs? | |
| Yes | 97 |
| No | 3 |
| Have you ever hunted? | |
| Yes | 30 |
| No | 70 |
| Have you tracked animals? | |
| Yes | 36 |
| No | 64 |
| What are the benefits of the forest? | |
| Water | 63 |
| Oxygen | 50 |
| Extraction | 40 |
| Esthetic | 36 |
| Tourism | 21 |
| Others | <2 |
| What are the problems of the forest? | |
| Crop raiding | 36 |
| Livestock depredation | 25 |
| Others | <2 |

such as elephants, wild boar, rhesus monkeys, tigers, and leopards.

Project responsibilities and skills

Patrolling the forest is their major job responsibility and nearly all of them participate in this task, with the majority of individuals going on patrols 10–20 times per month (Table 3). About one-third of them are also responsible at times for leading the patrols. The majority participate in additional tasks, such as cleaning and cooking, to keep the groups running smoothly. Other responsibilities that some participate in include wood chopping and physical training of other group members.

When asked what skills they have learned through their participation in the forces, the majority said patrolling and discipline. Other skills mentioned include parading, manners, scientific knowledge, and driving. Respondents felt the most important skills they learned were discipline and courage. Some respondents also mentioned scientific knowledge, language skills, arms, and patrolling.

Motivations to participate and benefits

The most common reason for joining the protection forces, reported by three-quarters of respondents, was for conservation of the forest and wildlife (Table 4). The second and third most common reasons, given by half of the

Table 1. Summary of the community forest guards' socioeconomic characteristics.

| Variable | % (unless noted) ($n = 99$) |
|---------------------------|-------------------------------|
| Mean age (years \pm SD) | 25.4 \pm 5.1 |
| Married | 47 |
| Father's occupation | |
| Farmer | 74 |
| No guardian or unknown | 10 |
| Government service | 8 |
| Business | 4 |
| Laborer | 4 |
| Caste | |
| Scheduled tribes | 92 |
| Other | 8 |
| Religion | |
| Hindu | 61 |
| Christian | 39 |
| Education (years) | |
| 0–9 | 14 |
| 10 | 61 |
| >10 | 25 |
| Landholding (bigha) | |
| <5 | 21 |
| 5–10 | 28 |
| 10–15 | 17 |
| 15+ | 34 |

Table 3. Community forest guards' project responsibilities and skills.

| Variable | % (n = 99) |
|---|------------|
| What job do you do most in the project? | |
| Patrolling | 92 |
| Cleaning | 73 |
| Cooking | 52 |
| Wood chopping | 42 |
| Lead physical training | 39 |
| Supervising | 10 |
| How frequently do you patrol? (times/month) | |
| 0–10 | 27 |
| 10–20 | 53 |
| 20+ | 20 |
| Do you lead patrols? | |
| Yes | 30 |
| No | 70 |
| What skills have you learned since joining the project? | |
| Patrolling | 82 |
| Discipline | 76 |
| Parading | 31 |
| Manners | 26 |
| Scientific knowledge | 20 |
| Driving | 3 |
| What is the most important skill you have learned? | |
| Discipline | 43 |
| Courage | 36 |
| Scientific knowledge | 8 |
| Language | 6 |
| Arms | 5 |
| Patrolling | 2 |

respondents, were to provide supplementary income to the family or to provide the primary income for their family.

The most common benefits that they said they gained personally from their involvement in the project were extraction of forest products and the friendships they have formed in the forces, with more than two-thirds mentioning each. Nearly as many respondents also mentioned they benefited from learning discipline. By discipline, respondents meant the militaristic aspects of the way the protection forces are trained and organized as some of the groups have been trained by retired army members. Over a third of respondents also felt that learning environmental knowledge was a benefit. A few mentioned having a job as a personal benefit.

Nearly everyone (89%) said they feel they are appreciated for the job, which is one indicator of a high level of job satisfaction.

Project perceptions

Nearly every respondent said that the goal of the project is conservation (Table 4). Small numbers also mentioned exploring the forest, economic reasons, and betterment of the forest as the goals of the project. Over half of the respondents mentioned each of the following as indicators of the project success: an increase in wildlife, a decrease

Table 4. Community forest guards' motivations to participate, perceptions of benefits, and knowledge of project.

| Variable | % (n = 99) |
|---|------------|
| Why did you join the project? | |
| Conservation | 75 |
| Economic (supplemental income) | 35 |
| For a job (primary income) | 16 |
| Self-motivation | 13 |
| What are the benefits to you of being involved? | |
| Extraction | 69 |
| Friends | 69 |
| Discipline | 64 |
| Environmental knowledge | 35 |
| Interactions | 10 |
| Job | 8 |
| Is your job appreciated by others? | |
| Yes | 89 |
| No | 11 |
| What are the goals of the project? | |
| Conservation | 96 |
| Explore the forest | 10 |
| Forest products | 9 |
| Betterment of forest | 8 |
| What are the indicators of the project's success? | |
| Wildlife increase | 56 |
| Smuggling decrease | 54 |
| Increased forest | 53 |
| Reduce/stop tree felling | 53 |
| Tourism | 4 |
| What are the benefits of the project? | |
| Wildlife increase | 77 |
| Poaching decrease | 77 |
| Tourism | 35 |
| Others | <2 |
| What are the problems facing the project? | |
| Lack of arms | 70 |
| Poor transportation | 44 |
| Lack of field equipment | 39 |
| Lack of camp facilities | 21 |
| Lack of raingear | 10 |
| Lack of electricity | 5 |
| Others | <2 |

in poaching, an increase in forest, and reduced illegal tree felling.

Respondents said the main benefits of the project were an increase in wildlife and a decrease in poaching. Some also mentioned tourism as a benefit. The primary problem that the guards see facing the project is a lack of arms. This is followed by a poor transportation, a lack of field equipment, and a lack of camp facilities. Some also mentioned lack of raingear and electricity.

Differences between groups

The forest protection forces have some significant differences among them (Table 5). Individuals in the Kachugaon/Ripu and Manas RF forces are older on average and, probably because they are older, more likely to be married and more educated than individuals in the Chirang and Kuklung RF forces.

Table 5. Comparison of forest protection forces.

| Variable | Kachugaon/Ripu RF (n = 48) | Manas RF (n = 15) | Chirang RF (n = 15) | Kuklung RF (n = 21) | p-Value |
|---|----------------------------|-------------------|---------------------|---------------------|---------|
| Age (mean ± SD) | 27.3 ± 0.8 | 27.1 ± 1.1 | 20.8 ± 0.9 | 23.1 ± 0.5 | < 0.01 |
| Marital status | | | | | |
| Married | 31 (65%) | 8 (53%) | 5 (33%) | 3 (14%) | < 0.01 |
| Religion | | | | | |
| Hindu | 21 (44%) | 4 (27%) | 15 (100%) | 1 (95%) | < 0.01 |
| Christian | 27 (56%) | 11 (73%) | 0 (0%) | 1 (5%) | |
| Education | | | | | |
| 0–9 years | 2 (4%) | 2 (13%) | 3 (20%) | 7 (33%) | 0.01 |
| 10 years | 28 (58%) | 11 (73%) | 13 (53%) | 13 (62%) | |
| > 10 years | 18 (38%) | 2 (13%) | 4 (27%) | 1 (5%) | |
| Have you hunted? | 18 (38%) | 6 (40%) | 4 (27%) | 2 (10%) | 0.08 |
| What are the benefits of forest? | | | | | |
| Water | 28 (58%) | 9 (60%) | 6 (40%) | 20 (95%) | < 0.01 |
| Oxygen | 19 (40%) | 5 (33%) | 8 (53%) | 18 (86%) | < 0.01 |
| What are the problems of the forest? | | | | | |
| Crop raiding | 11 (23%) | 9 (60%) | 4 (27%) | 12 (57%) | 0.01 |
| Livestock depredation | 8 (17%) | 5 (33%) | 1 (7%) | 11 (52%) | < 0.01 |
| Why did you join the project? | | | | | |
| Conservation | 34 (71%) | 9 (60%) | 12 (80%) | 20 (90%) | 0.05 |
| Supplemental income | 24 (50%) | 4 (27%) | 3 (20%) | 4 (19%) | 0.03 |
| Primary income | 11 (23%) | 3 (20%) | 2 (13%) | 0 (0%) | 0.07 |
| What are the benefits to you of being involved? | | | | | |
| Discipline | 31 (65%) | 11 (73%) | 4 (27%) | 18 (86%) | < 0.01 |
| Friends | 32 (67%) | 12 (80%) | 4 (27%) | 21 (100%) | < 0.01 |
| What skills have you learned since joining the project? | | | | | |
| Parading | 8 (17%) | 1 (7%) | 5 (33%) | 17 (81%) | < 0.01 |
| What are the goals of the project? | | | | | |
| Explore the forest | 3 (6%) | 0 (0%) | 0 (0%) | 7 (33%) | < 0.01 |
| What are the benefits of the project? | | | | | |
| Wildlife increase | 33 (69%) | 12 (80%) | 11 (73%) | 21 (100%) | 0.01 |
| What are the problems facing the project? | | | | | |
| Lack of arms | 33 (69%) | 10 (67%) | 8 (53%) | 19 (90%) | 0.08 |
| Poor transportation | 9 (19%) | 14 (93%) | 5 (33%) | 16 (76%) | < 0.01 |
| Lack of raingear | 0 (0%) | 0 (0%) | 0 (0%) | 10 (48%) | < 0.01 |

Notes: Only significant differences shown. *p*-Values are from Fisher's exact test because some cells have expected values of less than 5. ANOVA is used to test differences in mean age. Please note that for bivariate categories (e.g., married/unmarried, joined for conservation reasons/did not mention conservation), data is only shown for the positive cases.

The Kuklung RF forces are most likely to say they joined the forces for conservation reasons and least likely to mention income as a reason. Every respondent from the Kuklung RF said a benefit of being a guard was friendships and more mentioned discipline as a benefit than in the other groups. They are most likely to mention parading as a skill they learned. Fewer of them have hunted than in the other groups. On one hand, they are more likely to perceive problems facing the forces, such as lack of equipment and poor transportation, and more likely to perceive crop raiding and livestock depredation by wildlife as a problem. On the other hand, they are most likely to report water and oxygen as benefits of the forest, and most likely to perceive that project benefits include an increase in wildlife. Also, unlike any of the other groups, forest guards in these forces mentioned exploration of the forest as a goal of the project.

Discussion

Conservation reasons are given most frequently as the motivation for joining the project. The guards' conservation ethic is demonstrated by the high numbers of guards who perceive that the forest provides ecological services and esthetic benefits. Their conservation ethic is also demonstrated by their shared knowledge about the project, its goals, and indicators of the success. For example, conservation of forest and wildlife are mentioned almost equally as indicators of the project success, demonstrating that wildlife is an important component of the forest to the guards, and that their interest is not limited to trees and associated non-timber forest products. This diversity of values is mirrored in other studies that have found that local residents hold many values toward the environment (Allendorf et al. 2006; Allendorf 2007; Shanee 2012),

and support the idea that that people see themselves as embedded within ecosystems (Apostolopoulou 2012).

One limitation of the study is that we do not have data prior to their joining the forces to compare before and after their participation. The survey asks people to recall their motivations at an earlier point in time, so we cannot be sure what their motivations actually were at the time. However, it is clear that currently the conservation ethic is a key motivation for their conservation of the forest.

This conservation ethic is probably tied to their relationship with and knowledge of the forest, with most knowing a significant number of species, using plants for medicinal purposes, and having some experience hunting or tracking. Some of their conservation consciousness probably came from aspects of the GLCP. Issues of the environment and conservation were discussed frequently during the life of the project in village meetings, workshops, and at the larger celebration meetings. Some of the more educated or motivated community members acted as conservation leaders, passing along the message to others in their communities.

However, the destruction of the forest 15 years earlier also plays a role in people's desire to protect the forest. For example, at one community meeting, participants of the GLCP said they were ashamed that they had observed the cutting of their forest three times while doing nothing to stop it but they pledged that this would not happen again. Indeed, the forces patrolling Ripu RF confiscated over US\$100,000 of illegal logs, and the materials used to cut and transport them, within the first 7 months of their initiation.

It should be noted that except for the initial Bodoland Forest Protection Force, which received financial support from the Bodoland Territorial Council, there were no financial incentives to join the forces. They only began to receive salary after NGOs and the government began to support them based on their demonstrated success at protecting the forest. Guards now receive 3000 Indian rupees/month (currently US\$56/month), which is 3–5 times less than government forest department staff receives, and does not include housing and medical benefits that the government staff receive.

Their perceptions of the problems facing the project, such as a lack of equipment, also reflect that the project is not only about economic compensation for these guards. The forest guards have functioned at a low level of pay in relation to what Assam Department of Environment and Forests staff receives. They have functioned on soft grant money from grants and have had to function with uncertain support from forest department staff. Their salaries have been paid intermittently at times and there has been a lack of money for equipment. Despite this, salary was not mentioned as a problem.

We hypothesize that long-term involvement in a conservation project such as this includes an initial commitment to conservation that is then reinforced and strengthened by the involvement in the project. Project involvement provides access to information and a sense of group solidarity

that is formed when people participate in a common project with a common goal. For example, a study in Nepal, which examined motivations of the community tiger rangers, found that the initial motivation for participating in the tiger monitoring project was primarily economic, but the benefits they felt they were receiving at the time of the study (about 3 years into the project) were learning about conservation and tigers and travel opportunities to meet with the other tiger rangers, who were spread throughout the southern portion of Nepal (Allendorf et al. 2009). Integrating different types of benefits for individual participants into conservation projects can address issues that often weaken top-down conservation projects, such as a lack of group cohesiveness (Datta et al. 2012).

In addition to the role of conservation and economic benefits, many guards report that friendships they have with others in the protected forces are a benefit. The protection forces appear to be an important social space for these men, which is probably an important component of the success of these groups. Their appreciation of learning discipline and courage through their participation in the forces may also reflect other aspects of these friendships and the bonding that occurs between men in social groups such as these.

Their perceptions of the benefits of friendship, discipline, and courage are also reflected in the nature of the community institutions that they created, which demonstrate an unusual amount of democracy in collectively how jobs are carried out with all members doing many of the jobs. The democratic nature of the forces may also account for much more input within the patrols allowing a collective or composite knowledge to emerge in general and in patrols that often incorporated an average of 10–15 individuals.

In the case of these protection forces, the age of the guard also plays a role in his motivation to participate. While conservation is important for all age groups, older men are more likely to mention a motivation being a job or supplementary income, probably because they have more responsibilities to support their families than younger men. This also indicates that motivations can change over time and are not static. In this example, different motivations have different importance at different stages of life.

Age also seems to play a significant role in explaining differences between the groups. Chirang and Kuklung RF guards stand out as having younger members, a fact which seems to have influenced the flavor of the groups in many related ways. For example, because they are younger, and do not have the primary responsibility for supporting their families, they are less motivated by economic benefits than the other groups and more focused on conservation aspects. Their age probably also contributes to the more cohesive nature of the group, as demonstrated by their greater perception that benefits of the project are the friendships and the training.

Unemployed youth, who often have fewer family responsibilities, may be an unrecognized and potentially important source of support for conservation. We have

seen a similar phenomenon among community members of the Youth Anti-Poaching Units in Bardia National Park in southwestern Nepal, who participate in patrolling the park and in monitoring of the tiger population among other activities.

Finally, an important point to note is the absence of women in these groups. While they are community-based organizations, they are only representing and involving half of the community. Research has shown that women's involvement can greatly improve conservation outcomes (Westermann et al. 2005; Agarwal 2009). While these groups may be filling a larger social need of providing employment for educated young men who have little gainful employment, women are not directly benefiting from these groups, although they do benefit directly from forest conservation.

Conclusion

These community-based guardians of the Manas Biosphere Reserve forests are motivated to participate by multiple factors: conservation, social benefits, and economic opportunities. While conservation benefits play the primary role in motivating local people to participate in the project, economic benefits, and social aspects are also important factors. The future of conservation lies increasingly in the hands of communities who want to protect the environment and natural resources. The forest protection forces in Assam demonstrate the power of local communities and their understanding that conservation is important, not only or even primarily for economic benefits, but because of the value of the environment to their communities in a broader sense.

Acknowledgment

We would like to thank the US Fish and Wildlife Service Asian Elephant Conservation Fund for supporting this research.

References

- Agarwal B. 2009. Gender and forest conservation: the impact of women's participation in community forest governance. *Ecol Econ.* 68:2785–2799.
- Allendorf T. 2007. Residents' attitudes toward three protected areas in southwestern Nepal. *Biodivers Conserv.* 16:2087–2102.
- Allendorf TD, Gurung B, Smith JLD. 2009. Village ranger, bagh heralu, monitoring of tigers in Nepal. *Himalaya.* 29:57–64.
- Allendorf TD, Swe KK, Oo T, Htut Y, Aung M, Allendorf K. 2006. Community attitudes toward three protected areas in Upper Myanmar (Burma). *Environ Conserv.* 33:344–352.
- Apostolopoulou E, Drakou EG, Santoro F, Pantis JD. 2012. Investigating the barriers to adopting a 'human-in nature' view in Greek biodiversity conservation. *Int J Sustainable Dev World Ecol.* 19(6):515–525.
- Brockington D, Duffy R, Igoe J. 2008. *Nature unbound*. London: Earthscan.
- Dowie M. 2009. *Conservation refugees*. Cambridge (MA): MIT Press.
- Ghosh S. 2008. Report of wild elephant (*Elephas maximus*) population estimation in Bodoland Territorial Council (20th–26th Feb 2008). Guwahati (Assam): Report to the Assam Forest Department.
- Horwich RH, Das R, Bose A. 2013. Conservation and the current status of the golden langur in Assam, India with reference to Bhutan. *Primat Conserv.* 27:1–7.
- Horwich RH, Islari R, Bose A, Dey B, Moshahary M, Dey NK, Das R, Lyon J. 2010. Community protection of the Manas Biosphere Reserve in Assam, India and the endangered golden langur (*Trachypithecus geei*). *Oryx.* 44: 252–260.
- Horwich RH, Lyon J. 2007. Community conservation: practitioners' answer to critics. *Oryx.* 41:376–385.
- Horwich RH, Lyon J, Bose A. 2011. What Belize can teach us about grassroots conservation. *Solutions.* May–June: 51–58.
- Horwich RH, Lyon J, Bose A, Jones CB. 2012. Preserving biodiversity and ecosystems: catalyzing conservation contagion. In: Moutinho P, editor. *Deforestation around the world*. Rijeka (Croatia): InTech; p. 283–318.
- India Tiger Estimate 2010. 2011. New Delhi (India): Ministry of Environment and Forests, Government of India.
- McShane TO, Wells MP. 2004. *Getting biodiversity projects to work*. New York (NY): Columbia University Press.
- Milner-Gulland EJ, Fisher M, Browne S, Redford KH, Spencer M, Sutherland WJ. 2010. Do we need to develop a more relevant conservation literature? *Oryx.* 44:1–2.
- Persha L, Agrawal A, Chhatre A. 2011. Social and ecological synergy: local rulemaking, forest livelihoods, and biodiversity conservation. *Science.* 331:1606–1608.
- Schipper J, Chanson JS, Chiozza F, Cox NS, Hoffmann M, Katariya V, Lamoreux J, Rodrigues ASL, Stuart SN, Temple HJ, et al. 2008. The status of the world's land and marine mammals: diversity, threat, and knowledge. *Science.* 322:225–230.
- Schmitt CB, Burgess ND, Coad L, Belokurov A, Besançon C, Boisrobert L, Campbell A, Fish L, Gliddon D, Humphries K, et al. 2009. Global analysis of the protection status of the world's forests. *Biol Conserv.* 142:2122–2130.
- Shanee N. 2012. *The dynamics of threats and conservation efforts for the tropical Andes hotspot in Amazonas and San Martin, Peru* [PhD thesis]. Canterbury (UK): University of Kent.
- Turner WR, Brandon K, Brooks TM, Costanza R, da Fonseca GAB, Portella R. 2007. Global conservation of biodiversity and ecosystem services. *Bioscience.* 57:868–873.
- Westermann O, Ashby J, Pretty J. 2005. Gender and social capital: the importance of gender differences for the maturity and effectiveness of natural resource management groups. *World Dev.* 33:1783–1799.