

Protected Area Versus People Conflict and a Co-Management Programme: A Case Study from the Dhudpukuria-Dhopachari Wildlife Sanctuary, Bangladesh

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Abstract

Conflicts over the conservation of natural resources at the community level occur in different forms and at various levels of severity. These conflicts can be defined as situations in which the allocation, management or use of natural resources results in attacks on human rights or denial of access to natural resources to an extent that considerably diminishes human welfare. However, the conflict between the authorities of the Dhudpukuria-Dhopachari Wildlife Sanctuary (DDWS) and local people over wildlife conservation is one of the most serious conservation issues in Chittagong region of Bangladesh. The DDWS is managed under a co-management programme, but there are many questions that have already been asked about the success of co-management in the study area. A total of 195 standardized, structured and semi-structured questionnaires were administered randomly to villagers. The majority of respondents reported that they did not receive any potential benefit from the DDWS, and almost one-third of respondents reported that they had problems with the DDWS. Almost all respondents reported that they were unable to control the damage caused by wildlife. More than 80% of respondents reported that the co-management approach was not effective in mitigating conflict between people and protected areas. More than 45% of the participants in co-management program reported greater effectiveness of the co-management approach than non-participants. Moreover, the respondents who received more benefits from the Protected Areas (PA) reported more effectiveness of the co-management approach than those who received less or no benefits from the protected area. Integration of local knowledge and preferences into the co-management process will ensure the sustainability of the co-management programme by minimizing the conflict between people and protected areas.

Keywords: benefits sharing, co-management, conflict, conservation, protected area

1. Introduction

Rural villagers in many developing countries are vulnerable to the establishment of protected areas because they depend primarily on locally available resources for their livelihood and spiritual needs (Gadgil, 1990; Maikhuri, Nautiyal, Rao, & Saxena, 2001; Nepal & Weber, 1995; Saberwal, Gibbs, Chellam, & Johnsingh, 1994). In many developing countries in which human population growth is alarmingly high and the demand for fuel wood and fodder are increasing, conflicts over the utilization of such resources are likely to increase (Heinen, 1993; Straede & Helles, 2000). Most of the protected areas in the south Asian and Trans-Himalayan region (Bangladesh, Bhutan, India, Nepal, north-east Pakistan and southern Tibet) support various forms of land use, such as agriculture, livestock grazing, and the collection of minor forest products (McNeely & Scherr, 2003). However, the establishment of protected areas generally alters land use rights (Agrawal & Ostrom, 2001; Jim & Xu, 2003; Panusittikorn & Prato, 2001; Roth, 2004; Wilshusen, Brechin, Fortwangler, & West, 2002). Restricted access to and limited use of natural resources through legislation, law enforcement, and privatization of land have raised negative perceptions of protected areas in local communities (Greenough, 2003; Horowitz, 1998; Igoe, 2003; Mahanty, 2003; Negi & Nautiyal, 2003; Santana, 1991). Thus, conflicts over the use of such important natural resources are frequently found at the heart of the establishment and maintenance of protected areas (West, Igoe,

& Brokington, 2006). Moreover, traditional forest management and strict protectionist policies (i.e., fines and fence policies) are vague to local people (Greenough, 2003). Hence, protected areas, as with any development intervention, are also instrumental in influencing social conflicts between different human groups (West et al., 2006), e.g., between rich and poor (McLean & Stræde, 2003), castes (Paudel, 2005), ethnic groups (Nelson & Hossack, 2003), and between people and wildlife, that live adjacent to protected areas (Limbu & Karki, 2003).

The conflict between the authority of protected areas and local people over how to conserve wildlife is one of the most common problems throughout the developing world (Mishra, 1997). Crop damage and depredation of livestock are the major causes of conflicts, as reported in several studies (Kharel, 1997; Mishra, 1997; Saberwal et al., 1994; Sekhar, 1998). Whenever, wildlife cause serious damages to human livelihoods, a common response has been to kill them. This is frequently called “lethal control” or “persecution” (Woodroffe, Thirgood, & Rabinowitz, 2005). Thus, the conflict between local people and conservation authorities over how to conserve wildlife is a major conservation issue that is difficult to resolve and is considered an important factor that affects the relationship between protected areas and the people who live near such areas (Hill, 1998; Studsrød & Wegge, 1995).

Many initiatives have been taken to solve conflicts between protected areas and local people by providing goods and services, which are essential to people living in the vicinity of such areas (Heinen, 1993; Heinen & Mehta, 1999; McNeely, 1988; Metcalfe, 1995; Pearce & Moran, 1995; Sarker, 2010; Sarker & Røskaft, 2010; Wells, Brandon, & Hannah, 1992). For example, the Grass Cutting Program (GCP) has been successful in giving local people a positive perception of Royal Chitwan National Park (Lehmkuhl, Upreti, & Sharma, 1988) in Nepal. This mainly because it manages to give some customary user rights back and compensate local people for some of the direct disadvantages they suffer by living in the vicinity of a protected area, including problems with wildlife and restrictions on land uses, as well as the utilization of natural resources (Straede & Helles, 2000). Thus, crop and livestock damage, as well as resource extraction by farmers living in and around protected areas, must be managed in a cost-effective and sustainable way (Wang, Lassoie, & Curtis, 2006).

The management of protected areas has evolved from a focus on wildlife stocks and endangered species to more comprehensive tasks, including collaboration and communication with the surrounding local communities (Brandon, 1992; Ledec & Goodland, 1990; Wells et al., 1992). Effective conservation and management of reserves cannot be imagined without the assistance of local people (Limbu & Karki, 2003). Local participation in management to improve welfare is now widely considered a prerequisite for success in both the conservation and local development contexts. Such an approach complies with the philosophies of community-based conservation, co-management, and integrated conservation and development (Heinen & Mehta, 2000). Several studies have demonstrated clear linkages between developmental programs and positive attitudes towards conservation (Alexander, 2000; Maikhuri et al., 2001; Mehta & Heinen, 2001; Nepal & Weber, 1995; Studsrød & Wegge, 1995). In Myanmar, the large number of local people mentioning conservation benefits and the important role of these benefits in predicting positive attitudes indicate that these positive perceptions play a key role in people’s relationships with protected areas (Allendorf et al., 2006). Thus, integrating conservation and development projects has become popular as a way to alleviate the costs to the local communities in terms of loss of access to resources (Kiss, 1990; McNeely, 1988). Management should go beyond the boundaries of protected areas to include buffer zones (i.e., integration zones between protected areas and people) to realize the full importance of dealing with the livelihood issues of local people (Ghimire, 1994; Ghimire & Pimbert, 1997; McNeely, 1988, 1995; Schelhas & Shaw, 1995). Remarkable achievements in reversing local people’s negative perceptions of protected areas will not last far beyond the point at which the demand for national park resources cannot be satisfied, or at which national park authorities are compelled to re-establish strict nature protection (Straede & Helles, 2000). Understanding local residents’ perceptions and using them as a starting point to improve the protected area-people relationship through co-management can yield efficient and targeted interventions that are meaningful to local communities and their relationships with protected areas (Allendorf et al., 2006).

There are many questions that have already been asked as to how to succeed at community based conservation. Some participants in this debate make vigorous claims that participatory approaches (i.e., co-management) to conservation have been ineffective (Persha, Fischer, Chhatre, Agrawal, & Benson, 2010). For example, in Bangladesh, the selection of villagers to participate in the co-management conservation program is highly biased, where the relatives of the village leaders are included in the committee. The voices of disadvantaged, landless and poor people are always ignored in the decision-making processes, and they are excluded from the benefits of the co-management programs (Sarker & Røskaft, 2010).

Bangladesh has experienced the co-management of protected areas in different forms and practices, and shifted management policy from timber production to ecological requirements, the conservation of biological diversity,

and meeting the consumption needs of local people through the promulgation of Forest Policy of 1994, the Forest (Amendment) Act of 2000, and Social Forestry Rules 2004 (Uddin & Foisal, 2006). Moreover, a Tree Farming Fund (TFF) has been established to provide a sustainable revenue stream for community forestry projects, although implementation of such program faced roadblocks that stem from a top-down bureaucratic approach and poor governance system (Jashimuddin & Inoue, 2012). Large-scale social and community forestry projects (e.g., the Forestry Sector Project, the Sundarban Biodiversity Conservation Project, the Nishorgo Support Programme, and Climate-Resilient Ecosystems and Livelihoods Program) are supported by donors (i.e., the Asian Development Bank, the United States Agency for International Development, and Deutsche Gesellschaft für Internationale Zusammenarbeit). Such projects have been undertaken in Bangladesh over the last several decades and implemented in areas outside the reserved and protected forests to reduce biotic pressure on state forests, and provide gainful employment to an unemployed and underemployed workforce. However, the desired effects of community based conservation approaches have often been found to be temporary or minimal due to lack of devolution or decentralization, as found in many other studies (Holmes, 2003; Jashimuddin & Inoue, 2012). The success of community-based conservation is hindered by factors such as inadequate benefits and unequal distribution (Songorwa, 1999), undelivered promises and unrealized expectations (Gadd, 2005), limited or absent participation of communities in decision-making for resource management (Parry & Campbell, 1992), problematic, untested and unjustified assumptions (Kideghesho, Røskaft, & Kaltenborn, 2007), failure to respect local communities' interests (Songorwa, 1999), a lack of political commitment (Songorwa, 2004), or impractical critical links between development and conservation (Songorwa, Buhrs, & Hughey, 2000).

The Dhudpukuria-Dhopachari Wildlife Sanctuary (DDWS) is located in the south-eastern part of Bangladesh, and the sanctuary is being managed under a co-management programme. A number of national and international NGO's have been worked to promote co-management practices in the DDWS. No research has, on the other hand, been carried out to explore the effectiveness of the co-management programme to minimize the conflict between the park and people in the DDWS. Therefore, the major aim of this study was to explore the interaction (i.e., benefits and problems) between local people and the DDWS, in addition to measuring the effectiveness of the co-management programme in reducing the conflict between the protected area and local people. We predicted that the local people who participated in the co-management programme and received benefits from the conservation programme should be in more favour of conservation than the people who did not participate in the programme.

2. Materials and Methods

2.1 Study Areas

According to the Wildlife (Conservation and Security) Act 2012, the DDWS is closed to hunting, shooting or trapping of wild animals. The DDWS is considered to be an undisturbed breeding ground, primarily for the protection of wildlife and inclusive of all natural resources such as vegetation, soil and water. The DDWS was established in 2010 under Wildlife Conservation Act 1974 (22°19' N, 92°08'E; total area 4,716.57 ha) and has been managed by the Chittagong Forest Circle. The sanctuary areas are generally hilly, with shallow to deep gullies and gentle to steep slopes traversed by numerous streams (Figure 1).

2.2 Data Collection and Analyses

Respondents were living in villages adjacent to the boundary of the protected area. We carried out the fieldwork for data collection regarding the benefits or problems of the protected area perceived by respondents in its vicinity. We considered four types of benefits to understand the perceptions of respondents towards the conservation of the DDWS under the co-management programme. These are: (i) benefits from obtaining timber and firewood, (ii) benefits from training on alternative income generation (AIG) activities and receiving information on wildlife and nature conservation, (iii) benefits from a sound environment and tourism business, and (iv) benefits from receiving supports for AIG activities. We also asked respondents about the effectiveness of co-management in their area. We conducted sampling from June to August 2015 under several field periods. However, respondents were categorized as "participant" (i.e., involved in co-management) and "non-participant" (i.e., not involved in co-management). A list of direct beneficiaries of the co-management schemes was collected from the Bangladesh Forest Department. A total of 195 standardized, structured, and semi-structured questionnaires [i.e., participant (100) and non-participant (95)] were administered to the villagers over the age of 18. The respondents were selected randomly, and the completion of questionnaires was facilitated through "face to face" communication tool. Usually household heads were interviewed; however, in their absence, any adult member willingly to participate was interviewed. A series of supplementary questions were included in the interview to gather demographic and socio-economic information at the individual respondent level. During the interview, more concrete and simple questions following the everyday terms of people were included in the questionnaire. Benefits

and problems from the DDWS were described and then we extracted their attitudes towards the DDWS from their responses. The respondents' opinions were recorded as yes or no / agree or disagree. During the data collection, household position was recorded using a Global Positioning System device. The collected data were further categorized into income (i.e., poor: up to Tk. 15,000 per month; medium: Tk. 15,001 to 45,000; and rich: above Tk. 45,000), occupation (i.e., farmer and non-farmer), education (i.e., illiterate, primary, secondary, and above secondary), settlement status (i.e., local and immigrant, who migrated from another region of Bangladesh), age (i.e., young: 18-30 years; middle age: 31-50 years; and old: above 50 years), and household size (i.e., small size: up to 5 persons; medium size: 6 - 8 persons; and large size: above 8 persons). In this study, we defined both daily labourers and other occupations as "non-farmer".

Data were analysed using SPSS version 18.0 for Windows. Differences between socio-economic variables as well as perceptions were tested using Pearson's Chi-square (χ^2) tests. The relationship between respondents' perceptions and different independent variables were investigated using stepwise linear regression analyses. The significance level was set at $p \leq 0.05$.



Figure 1. Map of the study area in Bangladesh

3. Results

3.1 Demographic and Socioeconomic Analysis

The proportion of males (90.8%) among respondents was significantly higher than that of females (9.2%, $\chi^2 = 9.51$, $df = 1$, $P = 0.002$). Furthermore, the proportion of the middle age group (56.4%) was higher than the young (13.8%) and older (29.8%) age groups. The education status of respondents was observed as: illiterate (14.4%), below primary (57.4%), secondary (24.1%), and above secondary (4.1%). The literacy rate was significantly higher among participants (94%) than non-participants (76.8%, $\chi^2 = 11.66$, $df = 1$, $P = 0.001$). Agricultural farming (77.4%) was the major occupation among respondents, and the proportion of farmers was higher in the non-participant (89.5%) group than in the participant group (66%, $\chi^2 = 15.36$, $df = 1$, $P < 0.0001$). The majority of respondents belonged to the poor income group (93.8%), while others belonged to medium income group (3.1%) and rich (3.1%) groups. The proportion of financially poor was considerably higher in the participant group (97%) than in the non-participant group (90.5%, $\chi^2 = 6.54$, $df = 2$, $P = 0.038$). Almost 62.6% of respondents were immigrants, while 37.4% were local residents. The proportion of immigrants was significantly higher in the participant group (93%) than in the non-participant group (30.5%, $\chi^2 = 81.18$, $df = 1$, $P < 0.0001$). Household size did not differ between the participant and non-participant categories ($\chi^2 = 3.42$, $df = 2$, $P = 0.180$).

3.2 Benefits and Problems of the Co-managed DDWS

The majority of respondents (54.2%) reported that they did not receive any potential benefit from the DDWS, while 24.7% perceived benefits at a large amount and 21.1% received benefits at a small amount. The proportion of no benefits was significantly higher in the non-participant (80%) than in participant group (29.3%, $\chi^2 = 62.51$,

df = 2, $P < 0.0001$). The perceptions of respondents towards the benefits of protected areas (e.g. obtaining timber and firewood, receiving training on AIG activities and getting information on wildlife and nature conservation, receiving supports for AIG activities, and enjoying a sound environment and earning money from the tourism business) varied significantly between types of respondents (Table 1). The majority of respondents reported that they did not receive any benefit in the form of getting supports for AIG activities or of enjoying sound environment and the financial benefits of tourism business from the DDWS, other than obtaining timber and firewood, and receiving training on AIG activities and getting information on wildlife and nature conservation (Table 1). The proportion of those receiving benefits of timber and firewood was significantly higher in the non-participant than in the participant group (Table 1). However, the proportion of all other benefits was considerably higher in the participant than in the non-participant group (Table 1).

Table 1. The percentage of respondents who received benefits from DDWS and χ^2 tests for differences between the types of respondents

Benefits		Types of respondents			χ^2	df	p
		Non-participant (n = 95)	Participant (n = 100)	Total (n=195)			
Timber & firewood	None	4.2	15.0	9.7	12.25	2	0.002
	Small amount	23.2	35.0	29.3			
	Large amount	72.6	50.0	61.0			
AIG activities supports	None	80.0	29.3	54.2	62.51	2	0.0001
	Small amount	17.9	24.2	21.1			
	Large amount	2.1	46.5	24.7			
Training on AIG activities and getting information on wildlife & nature conservation	None	75.8	19.0	46.6	74.62	2	0.0001
	Small amount	23.1	39.0	31.3			
	Large amount	1.1	42.0	22.1			
Sound environment & tourism business	None	93.6	43.4	68.0	56.51	2	0.0001
	Small amount	5.3	38.4	22.2			
	Large amount	1.1	18.2	9.8			

Almost one-third of respondents (32.3%) reported that they experienced problems from the DDWS, which is managed under the co-management approach. Among them, the proportion was higher in the non-participant (54.7%) than in the participant group (11%, $\chi^2 = 42.61$, df = 1, $P < 0.0001$). The only problem associated with the DDWS as perceived by respondents was crop raiding by wild animals. Crop damage by wild Asian elephants (*Elephas maximus*) as well as other animals (such as monkeys, wild boars, porcupines, rats, and birds) was reported by respondents across the study area.

3.3 Ability to Control Damage and Peoples' Experiences with Conflicts

The majority of respondents (94.4%) reported that they were unable to control the damage caused by different wildlife, including wild elephants. Their ability to control such damage varied considerably between the two groups of respondents ($\chi^2 = 11.07$, df = 1, $P = 0.001$). None of respondents in the non-participant group was able to control damage caused by wild animals, while in the participant group, 11% reported that they were able to control such damage. More than half of respondents (57.4%) reported that the crop damage caused by wild animals was tolerable, while the remaining considered the damage to be intolerable (22.6%) and extremely intolerable (20%), and their perceptions varied significantly between the two groups: participant versus non-participant. The proportion that tolerated crop damage was significantly higher in the participant group (80%) than the non-participant group (33.7%, $\chi^2 = 51.19$, df = 2, $P < 0.0001$). Furthermore, more than half of respondents (55.9%) reported that the conflict between humans and wildlife has been reduced in their villages surrounded by the DDWS; however, a statistically significantly higher proportion was observed in the participant group (75%) than in the non-participant group (35.8%, $\chi^2 = 30.38$, df = 1, $P < 0.0001$).

3.4 Effectiveness of Co-management in Improving Habitat Conditions and Reducing Conflict between Protected Areas and People

The majority of respondents (n = 195, 70.8%) reported that the co-management approach was not effective in promoting habitat conditions as well as mitigating the conflict between people and the protected area, and the perceptions were significantly different between the two groups of respondents ($\chi^2 = 27.90$, df = 1, $P < 0.0001$).

The proportion of those who found the co-management approach to be effective was higher in the participant (46%) than in the non-participant group (11.6%).

3.5 Factors Contributing to the People's Perception towards the Effectiveness of Co-management Approach

A stepwise linear regression analysis was applied to examine the perception of respondents towards the effectiveness of the co-management approach as the dependent variable and tested with nine independent variables. This analysis showed that the types of respondents and the magnitude of benefits that they received from the DDWS were the most significant factors contributing to the variation in this perception. All independent variables together explained 16.8% of the variation in this perception. The findings of the analysis revealed that the respondents who participated in the co-management scheme reported that the co-management approach was more effective than those who did not participate. Moreover, the respondents who received more benefits from the DDWS reported that the co-management approach was more effective than those who received less or no benefits from the sanctuary. All seven other independent variables were insignificant (Table 2).

Table 2. Results of a stepwise linear regression with effectiveness of co-management as the dependent variable in relation to various independent variables (R = rank, t = t-value)

Independent variables	Effectiveness of co-management		
	R	t	p
Types of respondents	1	4.51	0.0001
Benefit from PA	2	2.37	0.019
Education	3	-1.30	0.195
Monthly income	4	0.79	0.432
Age	5	0.70	0.485
Problems of PA	6	0.37	0.708
Household size	7	-0.28	0.776
Gender	8	-0.15	0.883
Occupation	9	-0.13	0.897
Constant		25.44	0.012

4. Discussion

Peoples' perceptions related to the benefits and problems received from protected areas vary with their socioeconomic status (Sarker & Røskaft, 2010). Both local people and immigrant people depend on timber and firewood for their livelihoods, which degrades the forest resources dramatically (Infield & Namara, 2001). Daily labourers and unemployed people living in and around the DDWS frequently go to the forest to collect forest products for subsistence and for cash sale (Uddin & Faisal, 2006). They collect timber, bamboo, green firewood, and the cutting of saplings is a major concern for the recruitment of naturally regenerated plants (Kabir, 2013). Local people also collect edible wild fruits, seeds, roots, tubers, and leaves for food. Moreover, encroachment of forest lands occurs inside the sanctuary for agriculture, vegetable gardening, and the establishment of new settlements. In addition, influential local people used a number of water bodies inside the sanctuary for fish cultivation also. All of these activities contribute to habitat fragmentation and degradation. As a consequence, conflict between people and protected area have been reported in many parts of the DDWS and have become an important issue for the conservation of wild elephants in Bangladesh. It should be mentioned that DDWS has been considered as one of the most potential seasonal habitats for Asian elephant in the south-eastern part of Bangladesh.

However, to minimize the conflict between protected areas and people, most of the community-based conservation projects in Bangladesh, which were funded by different donors, implemented a variety of interventions closer to the park boundary under co-management scheme. Bangladesh Forest Department (BFD) forms co-management councils and co-management committees, which are comprised of representatives of civil society, local administrators, local villagers, and representatives of various government organizations. The councils are responsible for planning, management, and decision making in DDWS, whereas the committees are the operational bodies responsible for the implementation of the decisions and plans approved by the council. Moreover, community based patrolling groups have been formed for regular patrolling with BFD officials. In addition, village conservation forum, which comprises forest dependent household, also formed to reduce the dependency of local people on forest resources. Under the co-management scheme, members of the patrolling groups have received cash incentives, while almost half of members of the village conservation forum received supports for AIG

activities such as raw materials for weaving, fishing nets and fish fry for aquaculture, raw materials for making bamboo baskets, and seeds and seedlings for the cultivation of vegetables, fruit trees, timber trees, and medicinal plant species. Moreover, under co-management scheme, a few number of training programs and awareness building initiatives were undertaken related to AIG activities and mitigation measures of human-wildlife conflicts. Therefore, the proportion of all other benefits except benefits of obtaining timber and firewood was considerably higher in the participant than in the non-participant group. However, although a considerable proportion of participants in co-management program received some modest support for AIG activities, but such activities have not compensated for lost incomes, and most beneficiaries were continuing to use DDWS more or less as unsustainably as before as reported by many of them.

The present study showed that the villagers surrounding the DDWS faced higher levels of problems caused by wildlife, even with the implementation of community-based conservation projects. Crop raiding by wildlife was the major problem in the study areas reported by the respondents. Villagers expressed severe complaints as wild elephant damage portion of their crops or entire fields, resulting in low crop yields. Therefore, agricultural crop damage caused by wild elephants has been identified as one of the major factors to accelerate the conflict between park and people in DDWS. Villagers who are living closer to the park boundaries complained more of problems with crop raiding by wild animals, particularly wild elephants, compared to those living farther away from the park boundaries (Sarker & Røskaft, 2011) and their perceptions vary mostly based on the financial status of respondents (Infield, 1988). Poor immigrant people faced more crop raiding problems, frequently due to different crop raiders that include wild elephants, wild boar, porcupine, birds, rats, etc., since they lived closer to the park boundaries (Sarker & Røskaft, 2011). Therefore, they expressed their inability to control the crop damage, which formed their negative attitudes towards crop damage and ultimately causes the conflict between humans and wildlife, especially with wild elephants. Thus, the human-wildlife conflict is increasing mostly in some parts of the study area. However, many people residing closer to a park transferred their occupation from agricultural farming to non-farming activities due to their inability to control crop damage by crop raiders (Sarker & Røskaft, 2014).

The majority of respondents who were not included in the co-management programme disagreed with the effectiveness of the programme regarding mitigation of the people-protected area conflict in the DDWS. The participants in the co-management programme received training on AIG activities and received logistic supports in kind for various alternative income-generating activities, which is not common for those who stay outside of the programme and are fully dependent on the nearest forest for their daily subsistence (Kabir, 2013). Under such circumstances, villagers outside of the co-management programme largely reported that they did not receive potential benefits from the conservation scheme, and they were less tolerable to crop damage incurred by park animals. However, vulnerable poor people who are dependent on forest resources for their livelihood were excluded in the formation of forest user groups. Although some poor people are included in the forest user groups, their decisions were always neglected by village leaders, and in most cases, they were excluded from the decision-making process (Sarker & Røskaft, 2010). In the present study, we found that the participation of females was very low in the co-management programme. Rural women are one of the most deprived sections of society, and they face social oppression and economic inequality. Most of these women are extremely poor (Parveen & Leonhauser, 2004).

However, the participation of local people in decision-making can create room for the sharing of important knowledge and preferences. The integration of local knowledge into the co-management process will help formulate more effective management plans to ensure sustainability, as well as the equal sharing of benefits among local people and the authorities of the protected area by minimizing the conflict between them. Moreover, a revenue-sharing arrangements involving the local people would be a better initiative for the development of community, living adjacent to the protected area, through providing financial supports to the co-management organizations. In addition, training programs should be organized for BFD staff in order to ensure the sustainable management and utilization of local forest resources as well as to ensure governance and participation of females in the conservation program. Finally, the design of co-management program should be passed under a governance lens, so the outcomes and interventions needed to achieve them are better understood. Otherwise, it would be a big challenge for conservationists to sustain seasonal habitats of Asian elephants in the DDWS.

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