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Participation of ethnic minorities in natural forest management: Cat Tien National Park, Vietnam case study

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Abstract

Surveys combining in-depth interviews of households with participatory rural appraisal (PRA) were used to examine and assess the participation of ethnic minorities (EMs) in the management of natural forest resources and its impacts in Cat Tien National Park (CTNP), Vietnam. The results identified that although the sustainable development goal had not yet been achieved in CTNP, the management arrangement had succeeded in positive effects on social performance in terms of differences between participants and nonparticipants ($\chi^2 = 30.877$, $p = 0.000$). However, despite some positive effects, the participants faced many impediments such as a low subsidy, a long time to receive the subsidy, distrust in other participants and being sabotaged by neighbors. Based on the findings, the appropriate institutional strategies in CTNP should emphasize a reasonable subsidy to the participants and higher participation levels, social relationships and conservation awareness.

Introduction

Conventionally, natural resource management in general, or forest management in particular, has been based on centralized approaches without the participation of local people. For example, experience has shown that centralized approaches to forest management are often ineffective in reaching the objectives of conservation and sustainable management (Brown, 2002). Thus, to conserve forest biodiversity as well as secure local livelihoods, local participation in management and conservation is considered to be crucial. Recognition of their important roles meant resulted in collaborative management of forest resources emerging in the late 1970s that involved local people at different management levels (Jeanrenaud, 2001). Since then, this approach has become a common alternative to conventional arrangements for managing and conserving forest resources in various countries, involving sharing resource management roles among stakeholders (Jeanrenaud, 2001; Parai and Esakin, 2003; Dinh et al., 2010; Dinh, 2010; Swan, 2010); Dinh and Phom, 2020).

According to Ansell and Gash (2007), collaborative management can be understood as a governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented and deliberative and that aims to make or implement public policy or manage public programs or assets. Of course, the stakeholders involved in public policy or public programs or assets include not only state agencies but also non-state participants. In the context of this paper, non-state stakeholders refer to both community organizing groups and local individuals who participate in collaborative management activities. State stakeholders and non-state participants must meet together in a deliberative and multilateral process, and this process must be collective (Ansell and Gash, 2007). Undoubtedly, combining the strengths of different stakeholders is a rational response to the challenges of modern sustainable collaborative management (Carter and Gronow, 2005). Regarding biodiversity conservation, collaborative management is a generic term describing approaches of resource management that combine three important criteria: 1) recognition of the legitimacy of the development and conservation values, 2) acknowledging that conservation and development goals being

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not necessarily antagonistic and 3) a commitment to engage local people in environmental management (Fisher, 1995; Hartanto et al., 2003).

Within Vietnam, after the renovation policy was initiated in 1986, the decentralized approach to forest management and conservation activities has supposedly engaged local people including ethnic minorities (EMs) in decision-making, planning, functioning and management agreement (Dinh, 2010; Dinh et al., 2010; McElwee, 2016). Non-state stakeholders such as groups of households, individual households, communities and joint-venture companies have been encouraged to participate in forest resource management and conservation. The law on forest protection and development in 1991 (National Assembly of the Socialist Republic of Vietnam, 1991) recognized the legality of local residents and various economic sectors to manage forests. Thereby, the Vietnamese Government released its policy on the socialization of forestry, as well as of many other sectors, and collaborated with non-state stakeholders to share the management responsibilities and benefits. For example, the 327/CT program was initiated in 1993 to share forest resource management responsibilities with local communities through forest land allocation or contractual forest management (Government of the Socialist Republic of Vietnam, 1992; Howard, 1998; Hoang and Phan, 2010; Swan, 2010). Forested land is allocated to local households according to Decree 01/CP 1995 for forest protection; the land holders have rights to gather a small amount of non-timber forest products (NTFPs) on the land and to receive subsidies for the forest protection incentive (Government of the Socialist Republic of Vietnam, 1995). Decision 192/CT-TTg in 2003 established the legal requirements for socialized protected area management. This enables local communities or groups of households to participate in forest resource management in protected areas. In addition, more actors and networked interests have been involved, and interventions have created new environmental subjectivities (McElwee, 2016). In short, the above legislative developments contributed to and have had high potential for collaborative management of forest resources in Vietnam.

The resident population in Cat Tien National Park (CTNP) can be categorized into two main groups: 1) the Kinh people and 2) 16 different ethnic minority groups, including the Chau Ma (Ma), S'tieng (Xtieng, Stieng), Chau Ro, Saray, Tay, Nung, Dao, H'Mong, Hoa and Khme. Some positive impacts of CTNP on local livelihoods were identified (Dinh et al., 2010). Most of the EMs living within the core zones (CZs) and the buffer zone (BZ) have depended much on forest resources for generations and they have used forest resources for both self-consumption and income generation (Dinh, 2019b). Biodiversity in CTNP is endangered mainly by encroachment of forest land, illegal logging and poaching (Dinh et al., 2012a; Dinh, 2019a). Since 2001, pilot projects and programs such as program 661 (a forestland allocation program), program 304 (an ecotourism program) and a payment program for forest environmental services (PFES) have been implemented in the park for socioeconomic development and biodiversity conservation. PFES is a mechanism established between forest environmental service users and forest environmental service providers, aimed at mobilizing contributions from society for forest protection and enhancing the economic value of the forest environment. Local households who help protect the forests receive the PFES payment. However, despite the plan of collaborative management by local people and government, biodiversity loss in CTNP has been reported (Polet, 2003; Dinh and Dinh, 2007; Dinh, 2019a; Dinh, 2019b), and no comprehensive study has been made of the real situation regarding participation by local EMs.

The objective of this research was to clarify the participation of the EMs in the management of natural resources and to propose appropriate institutional strategies for better management of the park and improvement of the livelihoods of EMs.

Materials and Methods

Study sites

The study was conducted in CTNP in four provinces in southern Vietnam between longitudes 107°09′05″E and 107°35′20″E and latitudes 11°17′17″N and 11°50′20″N. In 2001, CTNP was recognized by the United Nations Educational, Scientific and Cultural Organization as a biosphere reserve of the world. CTNP covers an area of approximately 82,600 ha and consists of three sectors, namely South Cat Tien (SCT), West Cat Tien (WCT) and Cat Loc (CLS). In 2005, the wetland in the park was designated as a Ramsar site (Ramsar, 2005). Located in an area with a mixed climate of mountains, plains and highlands, CTNP is the most important protected area due to its high biodiversity (Cat Tien National Park, 2017).

Dinh at al. (2012a) summarized the situation in CTNP. There were more than 2,100 inhabitants in the CZs and approximately 200,000 residents in the BZ and most of these people relied heavily on forest resources for their subsistence and for income generation. The EMs had livelihood strategies combining farming, collection of NTFPs, logging, livestock raising, manufacture of handicrafts, aquaculture, participation in forest resource management activities and other employment.

Data collection

To reflect the collaborative resource management and biodiversity conservation, the research data were gathered in accessible sites where there were natural forests and the EMs were dependent on the forest resources. Thus, this research was conducted over six different sites in CTNP. A multi-stage procedure was used to select the sample households. First, selected sites were identified in the three zones of the park. Second, at least 10% of the total households at each study site was randomly selected for interviews (Dinh et al., 2010; Dinh et al., 2012; Dinh 2019b). However, the sample size also depended on the degree of variability or diversity in the population. Finally, one adult at each selected household was chosen randomly and interviewed. Primary data were gathered initially through a survey of 170 randomly selected households based on questionnaires and PRA. In addition, interviews were carried out with community leaders, government officials, staff of the park, foresters and project staff. The data covered qualitative and quantitative information including socioeconomic status, forest resource use, management system and awareness of biodiversity conservation.

In terms of the level of forest management participation in projects or programs, the scale ranged from no participation to a high level of participation: (1) never, (2) rarely, (3) sometimes, (4) very often and (5) always. For the purposes of forest resource use in terms of cash income, the scale range covered (0) never, (1) 1 to 25%, (2) 26 to 50%, (3) 51 to 75%, and (4) 76 to 100% (for example: 76% of the harvested forest products were sold). Based on the harvest frequency (never, rarely, sometimes, very often, always) and the number of the resource use categories, the resource use levels of the households surveyed ranged from a low to a high level of use: (1) low dependency (1–7 times/mth), (2) medium dependency (8–15 times/mth), (3) relatively high dependency (16–22 times/mth) and (4) high dependency (more than 23 times/mth).

Data analysis

The Statistical Package for Social Sciences (IBM Corp., 2013) and the Excel software package (Microsoft Corp.; Redlands, CA, USA) were used to analyze both the quantitative and qualitative data obtained. Each category of information interviewed was coded and tabulated. And a χ^2 test was used in the analysis. Attribute data such as gender, occupation, educational level, age, wealth level and length of residence (residency time) were assigned numerals. For example, ordinal data such as education level variable were coded 1 for illiterate 1, with grades 1–5, grades 6–9, grades 10–12 and higher education coded as 2, 3, 4 and 5, respectively. For ease of analysis, some quantitative data were converted to categorical data.

Results and Discussion

Sociodemographic characteristics of respondents

Of the EM sample interviewed during the field surveys, 98 (57.6%) were male and 72 (42.4%) were female. The mean age of the interviewees was 38.4 (median 36 yr) with a range of 18–91 yr. The mean ages of females and males interviewed were 35.1 yr and 40.8 yr, respectively. The majority of the respondents interviewed had low education levels. More than half of the respondents (50.6%) had completed 1–5 yr of formal education, approximately a quarter of them (21.8%) had no formal education level, while the respondents who had completed 6–9 yr formal education accounted for 22.4%. Among the latter group, only 4.1% had 10–12 yr of education and just 1.2% of the respondents had higher education. The proportion of very poor and poor households in the study was high being 30.0% and 31.8% of the total respondents, respectively. The dependent population accounted for 41.0% of the households surveyed. The economic status of the participants and the nonparticipants in the projects or the programs in terms of natural forest protection, conservation and rural development did not vary significantly ($F = 0.009$, $p = 0.066$).

Form of management system

The management board of CTNP under the Vietnam Ministry of Agriculture and Rural Development has overall responsibility for managing the CZs. However, management decisions in the BZ are made by various departments and local organizations under the authority of the four provinces. The BZ may provide a variety of sustainable uses which ensure the protection and conservation of the Park, and improve the local socioeconomic conditions. The transition zone (TZ) is used for sustainable socioeconomic development to reduce pressure on the park. Since the renovation policy of the Vietnamese Government, various international projects and programs involving biodiversity conservation and rural development have been implemented in the park. Under the decentralized approach, the incentive for local people in general and particularly EMs to participate in forest resource management and conservation activities was seen as a key priority for sustainable management of the park. Consequently, collaborative resource management was implemented in order to bring state and non-state stakeholders together in the collective action process.

Management responsibility

Based on the different zones of the park, there were various stakeholders who took a range of responsibility for biodiversity conservation, forest protection and management, payment for forest environmental services, community-based ecotourism, forest regeneration, watershed management, species rescue, environmental education and rural development. The stakeholders included CTNP, state forest enterprises (SFEs), departments of agriculture and rural development (DARDs), forestry committees of communes (FCCs), nongovernment organizations (NGOs) and local people. Fig. 1 shows the management responsibilities of various stakeholders recognized by the participants. About a quarter of the participants (19 respondents) were unaware of all stakeholders participating in the

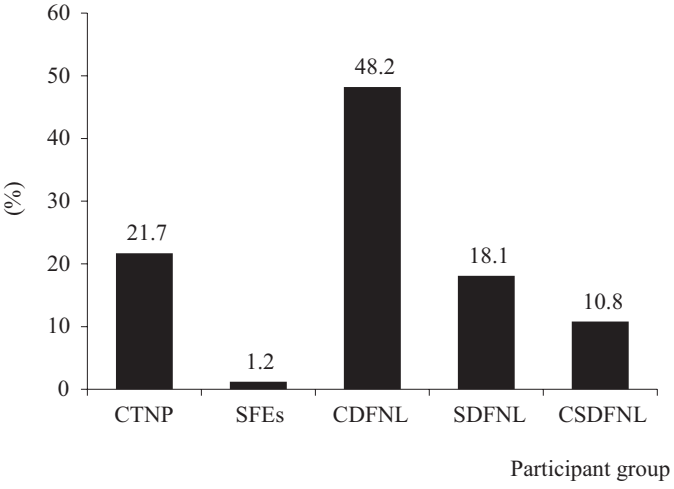

Fig. 1 Management responsibilities recognized by participants, where CTNP = Cat Tien National Park; SFEs = state forest enterprises; CDFNL = a combination of CTNP, Department of Agriculture and Rural Development (DARD), forestry committees of communes (FCCs), nongovernmental organizations (NGOs), and local people and other institutions; SDFNL = a combination of SFE, DARD, FCCs, NGOs, and local people and other institutions; CSDFNL = a combination of CTNP, SFE, DARD, FCCs, NGOs, and local people and other institutions

activities. For example, 21.7% of the participants, mostly respondents inside the CZ (16 out of 18 respondents), mentioned that only CTNP had the responsibilities, while one household interviewed in the TZ thought SFEs had these responsibilities. Nevertheless, 77.1% of the participants (including all the team leaders interviewed) recognized the sharing of management responsibilities among governmental organizations, local people and the other institutions.

Participation of ethnic minorities in natural resources management

Less than half the households surveyed (48.8%) participated in forest management and conservation activities. Each of these families were involved in one or more group activities (Fig. 2). Under the programs of collaborative forest management such as program 661 (payment for forest environmental services; Decision 380), program 304 (ecotourism) the local participants received subsidies for their participation. Before 2010, the subsidy was VND 50,000/ha/yr, which compared to the income of total forest resource per capita, was very small (Dinh et al., 2010). This was not sufficient to encourage the EMs to participate in the programs. However, since 2010, the annual amount has been VND 100,000/ha/yr. Additionally, only households who had already participated in program 661 or program 304 were signed contracts under Decision 380 with CTNP or the state forest enterprises (the subsidies under these programs were VND 100,000/ha/yr).

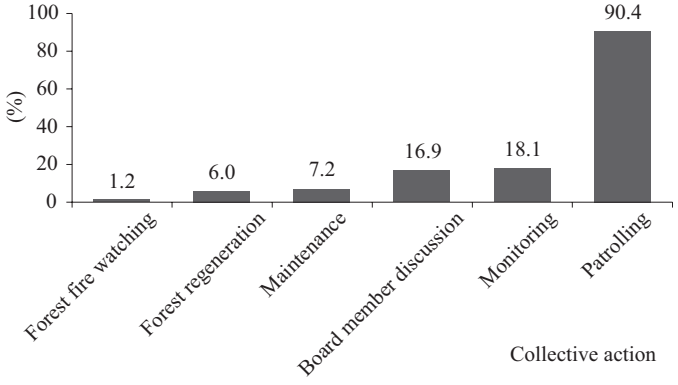

Fig. 2 Collective action by ethnic minorities in forest management

Other forest-related programs initiated in SCT were ecotourism in 1995 and community-based ecotourism in 2011. Only a few respondents involved in these programs recorded that they also participated in forest management activities. The main EM activities in ecotourism and community-based ecotourism were guides, stay services in the community long house, traditional dancing, ethnic music, gong shows, costume shows, sale of handicrafts of indigenous indigo textile fabrics at the Ta Lai Cultural Centre for the Indigenous Ethnic Minorities and at the CTNP headquarters (Dinh, 2010). One or more members of the households interviewed that were involved at Ta Lai in SCT mentioned one or more of the above activities in terms of employment, planning, decision-making and management. The findings confirmed that the levels of local participation between SCT and the two other sectors were different. The EMs in SCT had benefitted from the ecotourism and community-based ecotourism activities, but other respondents in WCT and CLS had not yet participated in any ecotourism programs (Dinh, 2010). Overall, the EMs participated in ecotourism activities at the small scale and at low levels in decision-making and the management process, respectively.

Based on the collaborative forest management programs, the EM participants were directly engaged in patrolling, monitoring, board member discussion, forest maintenance, forest regeneration and forest fire watching (Fig. 2). The local participants and staff of CTNP or the SFEs or government officials met together regarding these activities in a deliberative process. However, only 16.9% of the non-state participants were involved in board member discussion, so the ratio of locals participating in the decision making process was low.

Management planning of natural resources

In the study area, planning forest occurred for forest protection and management, payment for forest environmental services, community-based ecotourism and forest regeneration. Under the program of forest protection and management or payment for environmental service, a group of households in a hamlet took responsibilities, on a rotational basis, for patrolling and monitoring large forest plots (100–200 ha). The team was managed by a local man elected by the participants. This person was usually a head of a hamlet or a village, or a patriarch who was responsible for signing forest protection contracts and plans for patrolling, violation detection, forest fire watching and prevention and benefit sharing. The participatory teams had to inform of their activity plans to forest stations, the management board of CTNP, or the SFEs. Regarding the program for the payment for environmental service, one or two members in each team were chosen as community forest guards who stayed and worked together with the state forest guards.

Local willingness and regulations for Park forest resource protection

Traditionally, the EMs have customary rights to various kinds of forest resources in the CTNP, such as firewood and products of edible forest plants (Dinh et al., 2012b) and bamboo, resin and fodder. The current results showed that more respondents who participated in forest resource management and biodiversity conservation obeyed the regulations ($\chi^2 = 22.294$, $p < 0.05$). Conversely, the rate among nonparticipants was low (18.4%). By implementing collaborative management, more than half (53%) of the EM participants interviewed recognized the legal economic value on biodiversity conservation. Consequently, a majority of participants were aware of the importance of conservation, obeyed the regulations and attempted to protect the park. However, the rate of participants who did not obey the regulations was high (47%). Reducing this rate may require some strategies that address long-term benefits and involve environmental education programs.

Willingness to report illegal activities in terms of forest resource use is very important for protecting the Park. This is also one of the responsibilities of the local participants. Many participants interviewed

were willing to report activities of forest law violation such as forest land encroachment, poaching, logging or carrying timber illegally ($\chi^2 = 39.436$, $p < 0.001$). However, people often turned a blind eye when seeing others harvesting NTFPs because they did not rate it as an important impact on conservation. On the contrary, there was no difference in the willingness to a fight forest fire between participants and nonparticipants ($\chi^2 = 1.931$, $p = 0.165$, Table 1). According to an old Chau Ma man in CLS, Lam Dong province, whenever a forest fire occurred, traditionally all villagers would be willing to fight it because the forest had been their life for many generations.

Use of forest resources

All the households surveyed used one or more types of forest resources in the Park. The resource uses included: firewood, 100 species of edible forest plants (Dinh et al., 2012b), bamboo, encroaching forest land, forest animals, wild fish, honey, timber, resin and fodder (grazing in forest), as shown in Fig. 3. Notably, more households not involved in forest resource management and conservation activities encroached forest land, hunted forest animals, and logged or carried timber illegally ($p < 0.05$, according to Pearson χ^2 test, Table 2, Fig. 3). It was apparent from the information that the more the respondents participated in the management and conservation activities, the less they illegally extracted important forest resources. In contrast, more respondents who participated in the activities used irrigation water for their paddy rice or other agricultural crops ($p < 0.05$, Table 2). However, both participants and nonparticipants used bamboo, firewood and edible forest plants as primary forest products and the use levels of these resources did not differ between the two groups (Table 2, Fig. 3). In particular, nearly 100% of the EM households collected firewood which mainly came from natural forest and the demand for firewood for subsistence was very high.

The resource use by the EMs was categorized into four equal levels ranging from low to high use: low dependency, medium dependency, relatively high dependency and high dependency. As can be seen from Fig. 4, 80.5% of the nonparticipants were highly dependent, whilst for participants, this was nearly half that (43.4%). The study showed that the dependency levels on forest resources between nonparticipants and participants differed significantly ($\chi^2 = 25.918$, $p = 0.000$, Table 3). It was apparent that the collaborative management under the decentralization approaches was positive for biodiversity conservation in CTNP.

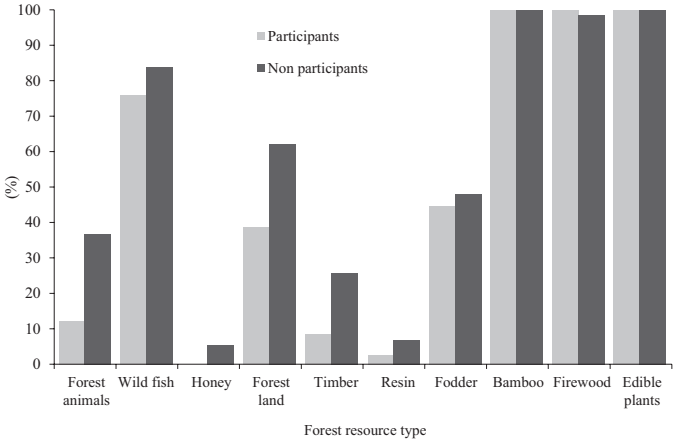

Fig. 3 Frequency of forest resources use by participants and non participants

Table 1 Summary of willingness to fight forest fire by respondents

Respondent category	Number	Willingness to fight forest fire				Test statistics
		Yes Frequency (%)		No Frequency (%)		
Involved in management	83	83	100	0	0	$\chi^2 = 1.931$, $P = 0.165$
Not involved in management	87	85	97.7	2	2.3	
Total	170	168	98.8	2	1.2	

Table 2 Frequency of the natural forest resources harvested by the EM respondents

Resource categories	Participants ($n = 83$)		Nonparticipants ($n = 87$)		p
	Yes (%)	No (%)	Yes (%)	No (%)	
Firewood	100	0	98.9	1.1	0.327
Edible plants	100	0	100	0	N
Bamboo	100	0	100	0	N
Forest land	38.6	61.4	62.1	37.9	0.001***
Forest animals	12.0	88.0	36.8	63.2	0.000***
Wild fish	75.9	24.1	83.9	16.1	0.192
Honey	1.2	98.8	5.7	94.3	0.109
Building materials	48.2	51.8	72.4	27.6	0.001***
Timber (logging or carrying)	8.4	91.6	26.4	73.6	0.002**
Resin	2.4	97.6	6.9	93.1	0.167
Folder (grazing in forest)	44.6	55.4	48.3	51.7	0.629
Irrigation	50.6	49.4	23	77	0.000***
Hydro-power	6	94	1.1	98.9	0.085

Pearson χ^2 test: * = significant at 0.05 level; **, significant at 0.01 level; ***, significant at 0.001 level; N = not significant

Table 3 Frequency distribution of forest resource dependency between participants and nonparticipants

Dependency scale	Participants (%)	Nonparticipants (%)	Total	*p*
Low	19.3	5.7	12.4	
Medium	19.3	4.6	11.8	
Relatively high	18.1	9.2	13.5	$\chi^2 = 25.918$
High	43.4	80.5	62.4	$p = 0.000$
Total (number)	83	87	170	

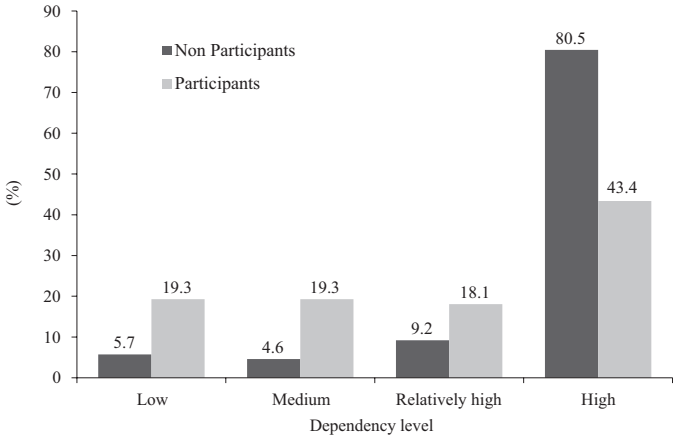

Fig. 4 Ethnic minority dependency level on forest resources

From Table 4, 72.6% of the nonparticipants used most of the forest resources (76–100% of the total amount harvested) for income generation, but for participants this was only 20.5%. There was a significant association between participation levels and forest resources used for cash income ($\chi^2 = 77.748$, $p = 0.000$). Hence, it was clear that the higher the participation level, the less extraction the forest resources for income generation.

A majority (62.7%) of the participants believed that collaboration promoted the management of the forest resources in terms of sustainable resource use and contribution to their basic needs. This perception liked their long term economic benefits to sustainable biodiversity conservation.

Impediments to participation

The results showed that the participants faced some difficulties in their participatory activities. The impediments were: low income, distrust in other participants, few days to rest at home, far from their families, long time to get subsidy, corruption, shortage of labor and being sabotaged by neighbors (Fig. 5). These factors may have influenced the lack of participation and contributed to the difficulty of achieving the dual goals of biodiversity conservation and socioeconomic development. The results showed that there were different impediments among the various participatory groups. For example, corruption and distrust in other participants only occurred in the local group of forest management in Da Oai, while most of the respondents in Brun Hamlet raised the issue of the shortage of labor. Furthermore, many respondents except those from Brun Hamlet were concerned about their low income from participatory activities. Peculiarly, a water reservoir managed by a S'tieng man and the Ta Lai Commune was sabotaged by local households. About 30.1% of the participants only wanted to participate at particular moments rather than being involved in day-to-day management activities. As a result, group-based arrangements may play a very important role for promoting collaborative management of forest resources in the Park.

Role of management system in changing local customary rules

The conventionally, the local ecological forest resource knowledge of the EMs reflects that their forest resource management and local traditional rules have been developed through various generations.

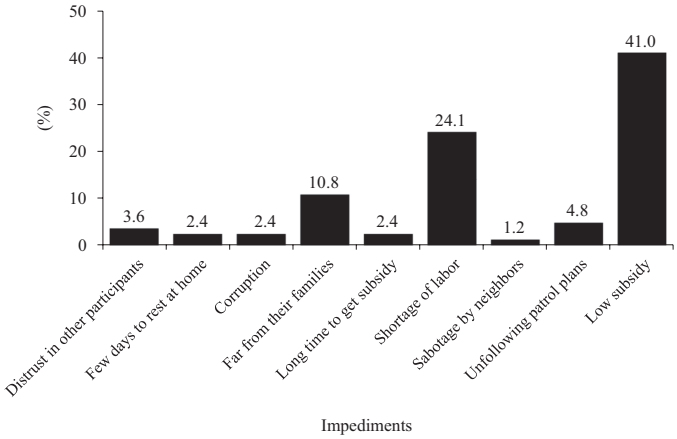

Fig. 5 Ratio of impediments to the participation

Table 4 Ratio of forest resources used for cash income

Participation level	Ratio of forest resources used for cash income					
	None	1–25	26–50	51–75	76–100	Total
None	3.5	0.6	2.4	7.6	37.1	51.2
Rarely	0.0	0.6	0.6	5.3	3.5	10.0
Sometimes	0.0	0.6	0.0	2.9	1.2	4.7
Very often	0.0	0.0	2.9	2.9	2.9	8.8
Always	5.9	3.5	4.1	9.4	2.4	25.3
Total	9.4	5.3	10.0	28.2	47.1	100.0

Their knowledge has generated not only opportunities but also challenges for biodiversity conservation resulting from such traditional uses as shifting cultivation and unsustainable use (Dinh et al., 2012a). Under the approach of collaborative resource management, their traditional resource management and some traditional rules have to be changed. For example, under the shifting cultivation systems, they selected forest land and asserted their land ownership and tenure in the community, but no official land titles were issued, whereas they had to follow fixed cultivation systems under the collaborative approach. More than half the participants interviewed (53%) stated that the collaborative management system succeeded in changing traditional rules in terms of the negative aspects for biodiversity conservation, in contrast to only 18.4% of nonparticipants. Official legislation and regulations for forest resource protection can be been promoted in a village or hamlet meeting or through a local training course. In practice, the local participants developed their own regulations that combined official and customary regulations.

Social effects of management system

The collaborative management contributed to strengthening social relationships and raising the conservation awareness of the participants. As can be seen from Fig. 6, the social effects of collaborative resource management differed significantly between the participants and nonparticipants (χ^2 = 30.877, p = 0.000 < 0.001, Table 5). More respondents involved in forest resource management and conservation activities (86.8%) believed that the collaborative management system strengthened their social relationships with different stakeholders and raised their biodiversity conservation awareness. Therefore, the collaborative approach under forestry reform played a role in promoting positive social effects in the Park. However, 13.2% of the participants recognized no effects of collaborative natural resource management.

Economic effects of management system

The development of collaborative resource management has resulted in many EMs gradually changing from unsustainable use of forest resources to activities more favorably related to conservation and sustainable socioeconomic development. Before such changes, many of these people did not have any job and they all ventured illegally into forest, reservoir and watershed areas of CTNP in search of wood, NTFPs and even encroached the forest land for cultivation. Recently they have had alternative sources of income from the collaborative activities. Indeed, the participants gained both subsidies and sustainable use of some types of forest products such as nuts of *Scaphium macropodum* (Miq.) mainly for sale, medicinal or edible forest plants, dead wood, fodder, thatch and construction trees for their private use. In reference to the subsidies and the payment and sustainable use derived from the collaborative activities, 59.04% of the participants rated these as satisfactory. These respondents considered the subsidies and the payment important part of their income for basic needs. In short, the subsidies derived from the programs or projects played a positive role in local livelihoods. This may promote extended involvement by the local EMs through alternative income generation. Still, 71.1% of them stated that the subsidies and the payment for their collaborative activities should be increased.

Most respondents considered the collaborative management had improved the status of the Park (60.6%), whereas 10.0% considered it unchanged, while 29.4% considered it was worse (Fig. 7). This showed that collaborative forest management may contribute to conservation of CTNP.

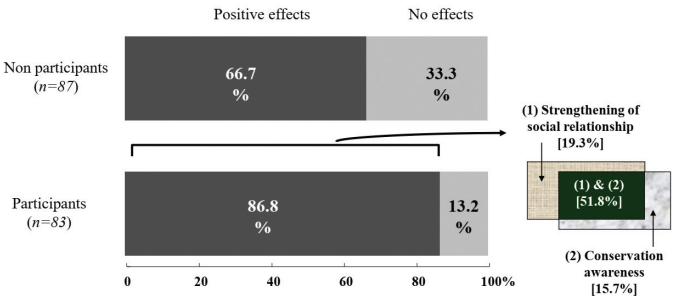

Fig. 6 Social effects of management

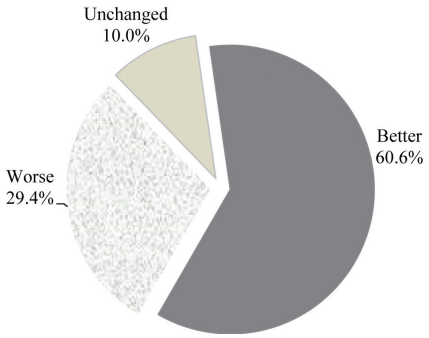

Fig. 7 Local opinions on Park status

Table 5 Social effects of collaborative management system

Respondent category	Respondent number	Social effects				Test Statistics
		Relationship strengthening (1) (%)	Conservation awareness raising (2) (%)	(1) & (2) (%)	No effect (%)	
Participants	83	19.3	15.7	51.8	13.2	χ^2 = 30.877
Non-participants	87	5.7	37.9	23.0	33.3	p = 0.000 ***
Total	170	12.4	27.1	37.0	23.5	

Pearson χ^2 test: ***, significant at 0.001 level

There were several major results from the research. First, under the decentralization approach, the resource use patterns differed between the participants and nonparticipants in the conservation programs. Due to the collaborative management schemes, the EMs tended to use the natural resources of the park in a sustainable manner. The EMs participated in various activities of natural forest management and conservation. Although the goal of sustainable development has not yet been achieved in this Park, the collaborative arrangement under the decentralization approach has produced some positive effects regarding the environmental and social performance in terms of strengthening social relationships and raising conservation awareness. Second, despite some positive effects, the participants still faced many impediments, including a low subsidy, distrust in other participants, few days to rest at home, being far from their families, a long time to get any subsidy, corruption among group members, a shortage of labor and being sabotaged by neighbors. Overall, the results also confirmed that the collaborative approach to natural resource management was successful in testing the policies on renovation and decentralization of forestry, which involved EMs in decision-making, planning, functioning and management agreements. Nonetheless, the participation of the EMs in the management and use of natural forest resources in CTNP did not fulfill the principles of commonly pooled resources designed by Ostrom (1990); consequently, CTNP did not meet the sustainable development goal.

Based on the results of the study, suitable institutional strategies for effective forest management and sustainable development in CTNP can be proposed. In particular, institutional arrangements should focus on participatory forest management as well as multiple local scales. First, management programs should be designed to be more attractive to achieve higher participation levels on larger scales. The EMs should be involved in income generation-based programs like ecotourism, collaboration-based plantations of cashews, bamboo or other crops outside the CZs. The EMs should be motivated to participate in conservation programs focusing on fulfilling their subsistence use of traditional forest resources. Second, a priority should be greater participation of the EMs in collective decision-making process in forest management and protection. More effort is necessary to promote the participation of the EMs in collaborative forest management. Likewise, the appropriate institutional strategies for effective forest management in CTNP should place emphasis on a reasonable subsidy to the participants, higher local participation levels, social relationships and conservation awareness of the EMs. Thus, the approaches of collaborative management as proposed by Ansell and Gash (2007) and decentralization of natural forest management can provide insights for participation among the local EMs in the context of the national parks in Vietnam.

Conflict of Interest

The author declares that there are no conflicts of interest.

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References

Ansell, C., Gash, A. 2007. Collaborative governance in theory and practice. J. Public Adm. Res. Theory. 18: 543–571. doi.org/10.1093/jopart/mum032

Brown, K. 2002. Innovations for conservation and development. Geogr. J. 168: 6–17. doi.org/10.1111/1475-4959.00034

Carter, J., Gronow, J. 2005. Recent Experience in Collaborative Forest Management. Centre for International Forestry Research (CIFOR). Bogor, Indonesia. doi.org/10.17528/cifor/001791

Cat Tien National Park. 2017. Annual Report in 2017. Cat Tien National Park. Dong Nai, Vietnam. [in Vietnamese]

Dinh., T.S., Dinh, Q.D. 2007. Chau Ma minority people's indigenous knowledge of forest resource use in Cát Tiên National Park. Journal of Agricultural Sciences and Technology 3: 113–117. [in Vietnamese].

Dinh., T.S. 2010. Participation of ethnic minorities in ecotourism: Case study of Cat Tien Biosphere Reserve, Vietnam. In: Proceedings of Biodiversity Management and Tourism Development. Lombok, Indonesia, pp. 202–210.

Dinh., T.S., Ogata, K., Yabe, M. 2010. Contribution of forest resources to local people's income: A case study in Cat Tien Biosphere Reserve, Vietnam. J. Fac. Agr., Kyushu Univ. 55: 397–402. doi.org/10.5109/18857

Dinh., T.S., Hyakumura, K., Ogata, K. 2012a. Livelihoods and local ecological knowledge in Cat Tien biosphere reserve, Vietnam: Opportunities and challenges for biodiversity conservation. In: Natarajan, I. (Ed.). The Biosphere. InTech. Rileka. Croatia, pp. 261–284.

Dinh., T.S., Ogata, K., Mizoue, N. 2012b. Use of edible forest plants among indigenous ethnic minorities in Cat Tien Biosphere Reserve, Vietnam. Asian Journal of Biodiversity 3: 23–49. doi.org/10.7828/ajob.v3i1.82

Dinh., T.S. 2019a. Ethnic minorities and forest land use: A case in Cat Tien National Park. J. Viet. Env. 11: 91–94. doi.org/10.13141/jve.vol11.no2

Dinh., T.S. 2019b. Indigenous knowledge of S'tieng ethnic on using edible forest plants in Cat Tien National Park. Can Tho University Journal of Science. 55: 8–15. doi: 10.22144/ctu.jvn.2019.071 [in Vietnamese]

Dinh, T.S., Phom, T.V. 2020. Participation of residents in managment and biodiversity conservation: a case study in Bu Gia Map National Park. Science and technology Journal of Agriculture and Rural Development. 13: 106–115. [in Vietnamese].

Fisher, R.J. 1995. Collaborative Management of Forests for Conservation and Development. IUCN-The World Conservation Union, World Wide Fund for Nature. Vaud, Switzerland.

Government of the Socialist Republic of Vietnam. 1992. Decision 327/CT on directions and policies on the use of barren land, denuded hills, forest, coastal sediments, and water surfaces. Government of the Socialist Republic of Vietnam. Hanoi, Vietnam. [in Vietnamese].

Government of the Socialist Republic of Vietnam. 1995. Decree 01/CP on regulating the lease of land for agriculture, forestry, and aquaculture productions in state enterprises. Government of the Socialist Republic of Vietnam. Hanoi, Vietnam. [in Vietnamese].

Hartanto, H., Lorenzo, M.C., Valmores, C., Arda-Minas, L., Burton, E.M., Prabhu, R. 2003. Learning together: Responding to change and complexity to improve community forests in the Philippines. Center for International Forestry Research (CIFOR). Bogor, Indonesia. doi.org/10.17528/cifor/001246

Hoang, H.C, Phan, T.G. 2010. Co-management: From jargons to realities. In: Proceedings of Co-management Concept and Practices in Vietnam. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Soc Trang, Vietnam.

Howard, C. 1998. Forestry in transition in Vietnam. Commonw. For. Rev. 77: 249–253.

IBM Corp. 2013. IBM SPSS Statistics for Windows, Version 22.0. IBM Corp. Armonk, NY, USA.

Jeanrenaud, S. 2001. Communities and forest management in Western Europe: A regional profile of the working group on community involvement in forest management. IUCN, The World Conservation Union. Gland, Switzerland.

McElwee, P.D. 2016. Forests are gold: Trees, people, and environmental rule in Vietnam. In: Sivaramakrishnan, K. (Ed.). University of Washington Press. Seattle, WA, USA.

National Assembly of the Socialist Republic of Vietnam. 1991. Law on forestry protection and development. National Political Publishing House. Ha Noi, Vietnam. [in Vietnamese].

Ostrom, E. 1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press. Cambridge, UK.

Parai, B.J., Esakin, T.C. 2003. Beyond conflict in Clayoquot Sound: The future of sustainable forestry. In: Castro, A.P., Nielsen, E. (Eds.). Natural Resource Conflict Management Case Studies: An Analysis of Power, Participation and Protected Areas. Food and Agriculture Organization (FAO). Rome, Italy, pp. 163–182.

Polet, G. 2003. Co-management in protected areas: The case of Cat Tien National Park, Southern Vietnam. In: Persoon G., Diny M.E. van Est, Percy E. Sajise (Eds.). Co-management in Protected Areas in Asia: A Comparative Perspective. Nordic Institute of Asian Studies. Copenhagen, Denmark.

Ramsar, 2005. Bau Sau wetlands and seasonal floodplain. https://rsis.ramsar.org/ris/1499, 4 August 2005.

Swan, S.R. 2010. Collaborative Forest Resource Management: CARE International Experiences in the Forest Sector, Northern Vietnam. CARE International. Hanoi, Vietnam.