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ATTITUDES OF ETHNIC MINORITIES TOWARDS BIODIVERSITY CONSERVATION IN CAT TIEN NATIONAL PARK, VIETNAM

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This paper explores the attitudes of the ethnic minorities in Cat Tien National Park (CTNP) towards the biodiversity conservation and collaborative management of nature resources. In total, 170 households from six sampled hamlets in the CTNP were interviewed. In-depth interviews carried out using participatory rural appraisal (PRA) method and chi-square test and one-sample *t* test were used for the analysis. The result showed that the conservation attitudes of the ethnic minorities had significant association with various different socio-economic characteristics. Migration status, participation level and resource-use pattern affected their conservation attitudes ($p = 0.000 < 0.05$). Collaborative management practice was closely related to conservation attitudes of the ethnic minorities. Based on the findings, biodiversity conservation strategies in CTNP should put emphasis on migrant ethnic groups, natural resource dependents, and nonparticipants. Besides, group-based arrangements would promote positive attitudes towards conservation and collaborative management. Appropriate institutional strategies for effective biodiversity conservation and sustainable development in CTNP are proposed.

Keywords: Forest resources, local residents, opinion, protected areas, resource use

INTRODUCTION

Biological resources in national parks have played an important role in livelihoods of local people. Several studies have illustrated that national parks have positive effects on local residents (e.g. Dinh et al. 2012, Dinh 2019). National parks have provided main foodstuff, medicinal plants, basic materials, good climate, landscapes and environmental services to local people, especially poor residents and ethnic minorities (Dinh et al. 2012, Kamal & Lim 2019, Dinh 2019). However, conflicts between national parks and local population have occurred in many places (Akama et al. 1995, Straede & Helles 2000, Dinh et al. 2012). To reduce the conflicts, local participation in biodiversity conservation, collaborative forest management and ecotourism are needed (Carter et al. 2003, Dinh 2010).

A number of studies have found that local attitudes towards conservation of protected areas are related to crop damage, utilisation of natural resource, resource management, and wildlife conservation (Akama et al. 1995, Nepal & Weber 1995, Shibia 2010). Interactions between local people and national parks may create different attitudes towards conservation and collaborative management. Sociodemographic variables influence the level of participation of households as well as their attitudes towards natural resource conservation (Brennan & Luloff 2007). Sustainable use and management of common pool resources require cooperation between conservation stakeholders and users (Ostrom 1990). Thereore, collaborative natural resource management and conservation involve local people in different levels of management (Carter et al. 2003, Ansell & Gash 2007). Consequently, positive attitudes of local people play an important role for sustainable development of a national park.

Therefore, this study identified the attitudes of the ethnic minorities towards biodiversity conservation in CTNP and clarified the appropriate institutional strategies for effective conservation and sustainable development for the park.

MATERIALS AND METHODS

The study was conducted in Cat Tien National Park (CTNP), a tropical rainforest in the south-east region of Vietnam, at 11° 20'–11° 50' N, 107° 09' –107° 35' E (Figure 1). It covers an area of approximately 71,350 ha and consists of three sectors: south Cat Tien, west Cat Tien and Cat

Loc (CTNP 2017). In 1998, these three sectors were integrated into CTNP (GSRV 1998). The national park is divided into three zones. The core zone is strictly protected; some activities and sustainable resource uses can be acceptable if they are in accordance with its conservation goals. The buffer zone may provide a variety of sustainable uses which ensure the protection and conservation, and improve the local socio-economic conditions. The transition zone is for sustainable socio-economic development to reduce pressure on the park (CTNP 2017). There are approximately 2100 residents in the core zone and over 200,000 people in the buffer zone. The ethnic minorities accounted for 89.2% of the population in the six study hamlets. About three quarters of the local people depended on forest resources for their livelihood. Many generations of ethnic minorities inside the core and buffer zones of the CTNP depended a lot on natural resources.

To reflect the attitudes of the ethnic minorities, research data were gathered in places where there were natural forests in or adjacent to the study sites, the ethnic minorities were dependent on forest resources, and the sites were accessible. At least 10% of the total households of each study site were randomly formed samples for interviews (Dinh et al. 2012, Dinh 2019). Random household numbers in the study sites were selected to ensure that each household had an equal chance of being represented in the survey. Likewise, 170 households of ethnic minorities from 1116 families in six hamlets were selected through random sampling. Thus, all the sample households agreed to be interviewed. Finally, one adult at each selected household was chosen randomly for the interview. The average household size consisted of 4.3 persons per family. The ethnic minorities in this research consisted of indigenous and migrant ethnic minorities. Indigenous ethnic minorities include S'tieng and Chau Ma while migrant ethnic minorities were Tay, Dao and Nung groups. Of these, Chau Ma community represented the highest proportion (62.4%), followed by Dao (20.6%), S'tieng (15.9%), Nung (0.6%), and Tay (0.6%). The data collected were primary as well as secondary in nature. Primary data were gathered initially through household interviews based on questionnaires, i.e. participatory rural appraisal (PRA). Interviews were also carried out with hamlet heads, local officials, staff of CTNP and non-governmental organisations. Data covered qualitative and quantitative information including socio-economic status, natural resource use, management system, and awareness of biodiversity conservation. Secondary data used in this study were mostly drawn from previous studies by the authors as well as other documents.

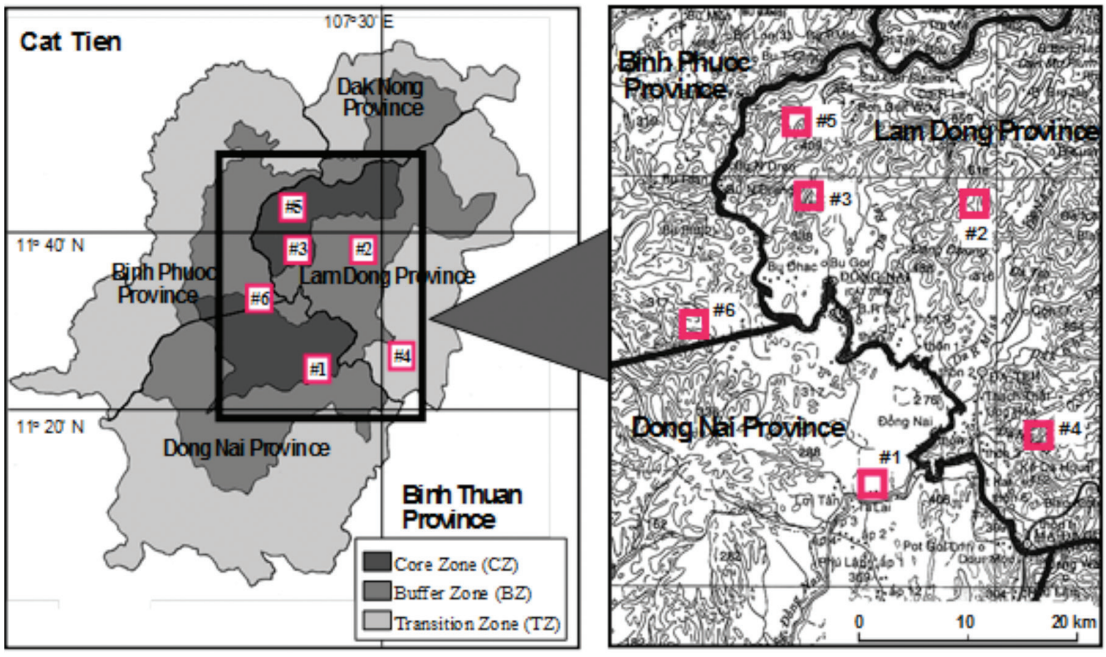

Figure 1 Locations of the study sites in Cat Tien National Park

Based on the harvest frequency and the categories of forest resource use, the use levels of the respondents ranged from low to high: (1) low dependent (1–7 times a month), (2) medium dependent (8–15 times a month), (3) relatively high dependent (16–22 times a month), and (4) high dependent (≥ 23 times a month). For levels of participation in projects or programmes in terms of forest management and environmental services; the scale ranged from no participation to high participation level: (1) never, (2) rarely, (3) sometimes, (4) very often, and (5) always. For the purposes of forest resource extraction for cash income, the scale ranged as follows (0) never, (1) 1–25%, (2) 26–50%, (3) 51–75%, and (4) 76–100%.

Attitudes can be understood as any affective reaction to a person, feeling, idea or action. To understand the attitude regarding different aspects of biodiversity conservation and collaborative management of nature resources in the surveyed areas, discussions and direct or indirect questions were used flexibly in order to gain intensive understanding of the respondents. To rank their attitudes, the Likert scale was used to rate from 1 (strongly disagree) to 4 (strongly agree) (Likert 1974). Each rank was coded with a number respectively. To calculate conservation attitudes, each response of positive attitudes to each question was scored as 1 and a negative answer 0, and the attitude of a respondent was summed up from all positive answers. The research questionnaire consisted of 18 questions regarding household demographics and 11 conservation statements (Table 1). Chi-square test, Kruskal-Walli's test and Mann-Whitney U and one-sample *t*-test were used for the analysis.

RESULTS AND DISCUSSION

According to the survey results, the mean age of the interviewees was 38.4 years with a range from 18 to 91 years. More than half (50.6%) of the respondents completed 1 to 5 years of formal education. More than one-fifth of them (21.8%) had non-formal education, and the interviewees who had 6 to 9 years of formal education accounted for 22.4%. Among them 4.1% completed 10 to 12 years of education and only 1.2% of respondents reached higher education. The percentage of the very poor and poor families were high, i.e. 30 and 31.8% of the total interviewees respectively. Overall, indigenous ethnic minorities accounted for 78.2% of interviewees and migrant ethnic minorities, 21.8%. The economic status of the nonparticipants and the participants in the projects or programmes in terms of forest protection, biodiversity conservation and environmental services did not vary significantly ($F = 0.009$, $p = 0.066$).

Table 1 shows 11 conservation statements among the respondents rating on a category from 1 (strongly disagree) to 4 (strongly agree). The one-sample *t*-test was used to show the difference between the statement mean and the sample midpoint of the variables. The midpoint in this research was chosen as 2.5. Only three statements (WIL, IMP, and OLI) were not significantly different from the test value, i.e 2.5. All statements had mean scales higher than the test value except MOR, i.e. RES (2.95), EQU (3.36), STO (3.10), SUS (3.83), DIS (3.18), PRO (3.11), and CON (3.57). The percentage of the interviewees who strongly agreed that they should apply sustainable methods to extract forest products (SUS) was very high (87.1%). Majority of respondents strongly disagreed that there were more wild animals now than a decade ago (MOR = 89.4%). They believed that CTNP would disappear soon if access to its resources was not limited (DIS = 92.9%). It was clear that the local ethnic minorities recognised the consequences of overhunting, over trapping and harmful harvesting practices in the park. About 90.6% of them agreed or strongly agreed that establishing CTNP was necessary to conserve biodiversity (CON). Approximately 91.2% respondents recognised that it was important to protect and conserve wild animals and forest plants so that future generations might know and utilise these resources (PRO).

The respondents strongly had mixed views about their responsibility to protect the forest and preserve the biodiversity of CTNP (RES = 11.2, 20.0, 31.2 and 37.6% for strongly disagree to strongly agree) (Table 1). According to Pearson chi-square test, the statement was significant with migration status ($\chi^2 = 42.336$, $p = 0.000 < 0.05$), participation level ($\chi^2 = 1.312$, $p = 0.000 < 0.05$), and resource-use pattern ($\chi^2 = 64.415$, $p = 0.000 < 0.05$) (statistical results are shown in tables). There were higher percentages of indigenous ethnic minorities, low dependents on natural resources, and households who were involved in natural resource management, conservation

activities and environmental services. They recognised their responsibility to protect forest and preserve biodiversity of CTNP. Similarly, despite low income from participatory activities, the indigenous ethnic minorities in CTNP were willing to protect the forest because they had been living in the park for many generations and the forest provided favourite traditional edible plants for them (Dinh et al. 2012). Thus, the forest resources retained in their traditional culture contributed to maintaining the good relationship among forest-indigenous people.

As many as 32.4% of the respondents were very willing to contribute to conservation cause (WIL; Table 1). Pearson chi-square method was used to test the relation between WIL and each of these variables: education status, gender, migration status, participation level, and resource-use pattern. There were significant differences between WIL and migration status ($\chi^2 = 50.537$, $p = 0.000 < 0.05$), participation level ($\chi^2 = 96.758$, $p = 0.000 < 0.05$), and resource-use pattern ($\chi^2 = 47.689$, $p = 0.000 < 0.05$). This implied that more indigenous ethnic minorities, more low-dependent people (on natural resources), and more households involved in natural resource management, conservation activities and environmental services were willing to contribute to conservation cause of the park. Dinh (2010) found that only the indigenous ethnic minorities participated in activities related to ecotourism. Most indigenous ethnic minorities had favourable attitudes towards development of ecotourism which incorporated traditional values of indigenous culture.

The statement "Distribution of benefits derived from natural resources in CTNP is equitable" (EQU) was ranked from strongly disagree (1) to strongly agree (2) as follows: 5.3, 8.2, 31.2 and 55.3% (Table 1). EQU was significantly different from migration status ($\chi^2 = 16.736$, $p = 0.001 < 0.05$), participation level ($\chi^2 = 45.128$, $p = 0.000 < 0.05$), and resource-use pattern ($\chi^2 = 28.241$, $p = 0.001 < 0.05$). In other words, more indigenous ethnic minorities and more families (indigenous ethnic minorities and migrants) participating in natural resource management, conservation activities and environmental services believed that the distribution of benefits derived from natural resources in CTNP was equitable. Instead, the indigenous ethnic minorities who were low

Table 1 Conservation statements among the respondents

Statement	Category (%)*			
	1	2	3	4
1. Local residents' responsibility is to protect forest and preserve biodiversity of CTNP (RES)	11.2	20.0	31.2	37.6
2. You are willing to contribute to conservation cause (WIL)	29.4	14.7	23.5	32.4
3. Local living condition is improved thanks to the establishment of CTNP (IMP)	24.7	30.0	18.8	26.5
4. Distribution of benefits derived from natural resources in CTNP is equitable (EQU)	5.3	8.2	31.2	55.3
5. Forest land encroachment, illegal logging, hunting and trapping should be stopped (STO)	11.2	15.3	25.9	47.6
6. You should apply sustainable methods to extract forest products (SUS)	0.6	2.9	9.4	87.1
7. Even if the forest is not there, you can find other livelihood strategies for income generation (OLI)	30.0	24.7	27.1	18.2
8. CTNP will disappear soon if access to its resources is not limited (DIS)	0.0	7.1	68.2	24.7
9. There are more wild animals now than a decade ago (MOR)	89.4	10.6	0.0	0.0
10. It is important to protect and conserve wild animals and forest plants so that your future generations may know and use them (PRO)	1.8	7.1	70.0	21.2
11. Establishing CTNP is necessary to conserve its biodiversity (CON)	1.8	7.6	22.4	68.2

* 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree

dependents on natural resources thought that the distribution was inequitable. Consequently, this would cause conflicts among the people.

Kruskal-Walli's Test and Mann-Whitney U were used to test the relationship between the conservation attitudes of the ethnic minorities and different socio-economic variables. The result showed that the conservation attitudes of the ethnic minorities had significant association with migration status ($\chi^2 = 1069.00$, $p = 0.000 < 0.05$), participation level ($\chi^2 = 90.860$, $p = 0.000 < 0.05$), and resource-use pattern ($\chi^2 = 83.443$, $p = 0.000 < 0.05$). Their conservation attitudes did not have significant association with education level, welfare, land area and livestock holding. The finding was similar to the relationship between attitudes of the locals and education level reported by De Boer and Baquete (1998) and Shibia (2010). This showed that indigenous ethnic minorities who participated in natural resource management, conservation activities and environmental services had positive attitudes towards biodiversity conservation, unlike the migrant ethnic groups and nonparticipants. Actually, the migrant ethnic minorities group did not like the strict rules on forest protection because they limited their illegal activities such as poaching, encroaching forest land and overusing non-timber forest products. The returns from illegal activities were many times greater than those from participation in natural resource management. The migrant ethnic minorities had various livelihood strategies, and when it was very limited for them to select more sustainable ways, they became poachers, illegal loggers or encroachers. As a result, the migrant ethnic minorities had negative attitude towards biodiversity conservation of CTNP. Therefore, this would create problems for biodiversity conservation in the park.

Boundaries were not defined clearly in this context. All households of the migrant ethnic minorities who were not involved in the management and conservation activities harvested more important resources and did not recognise their responsibility to protect the forest and preserve biodiversity. However, they had positive attitudes towards biodiversity conservation but were not willing to contribute to conservation cause of the park. In contrast to this, some models of sustainable use were recognised by the local government and CTNP. Similar to the case of walnut fruit forest in Kyrgyzstan (Carter et al. 2003), the indigenous ethnic minorities in Brun hamlet in CTNP had the rights to harvest nuts of *Scaphium macropodum* inside the core zone but at the same time, they had to protect the trees harvested. The authorities of CTNP recognised this sustainable harvest of the ethnic minorities in Brun. Under the collaborative approach, the indigenous ethnic minorities in Brun in CTNP participated in protection and management of natural resources. Besides, they had rights to harvest some types of non-timber forest products for their subsistence. This model may be applied in other protected areas in Vietnam. Similarly, Shibia (2010) found that households who got benefits from the protected area had positive attitudes towards conservation compared with those who did not. Similar to the case in Peninsular Malaysia (Kamal & Lim 2019), the indigenous people in CTNP were also recognised as partners in the management of natural resources.

CONCLUSIONS

The result showed that the conservation attitudes of the ethnic minorities had significant association with different socio-economic characteristics. Migration status, participation level and resource-use pattern affected their biodiversity conservation attitudes. The collaborative management practice was closely related to conservation attitudes of the ethnic minorities. The indigenous ethnic minorities who were involved in management and conservation activities recognised their responsibility to protect forest and preserve biodiversity.

Based on the attitudes towards biodiversity conservation, appropriate institutional strategies for effective conservation and sustainable development in CTNP are proposed. Different management arrangements between two different groups were necessary for improving attitudes of the nonparticipitants towards biodiversity conservation. Group-based arrangements would promote positive attitudes towards conservation and collaborative management. Biodiversity conservation strategies in CTNP should put emphasis on the migrant ethnic minorities, natural resource dependents, nonparticipants and benefit sharing of natural resources. To decrease the dependence of the ethnic minorities on the natural resources, income-

generation activities, more sustainable ways of the resource use and biodiversity conservation education should be promoted, especially for the migrant ethnic minorities and nonparticipants. The indigenous ethnic minorities should be recognised as partners in the collaborative management of natural resources and more effort is necessary to promote participation of the migrant ethnic minorities in the management. More participation in forest management and protection, ecotourism activities, projects of traditional handicraft products may be one of the effective strategies for sustainable biodiversity conservation in CTNP.

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