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Contribution of Forest Resources to Rural Livelihood of Local Community in Protected Areas of Vietnam- Case of Thuong Tien Nature Reserve, Kim Boi District, Hoa Binh Province

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Introduction

The establishment of protected areas (PAs) has provided a means of conserving biodiversity, maintaining the ecological balance and supporting sustainable use of natural resources in Vietnam (ICEM, 2003). However, while there had been a significant increase in the number and size of protected areas, biodiversity had continued to decline (MPI and UNDP, 1999). The major source of pressure on Vietnam's protected areas derives from the areas that communities living in and around the protected areas, in what are frequently considered as buffer zones (MPI and UNDP, 1999). In Vietnam, many traditional ethnic peoples in the uplands have for centuries lived in and around the PAs. They make use of those forest resources in their livelihoods for a long time, even before the protected areas were founded. These local populations are generally poor, isolated communities, which practice shifting agriculture, subsistence hunting and forest product exploitation for survival and thereby often conflict with conservation objectives (N.N. Phuong and S.A. Dembner, 1994)

Vietnam's protected areas have provided a number of benefits to the development of local communities, however these benefits are often overlooked (ICEM, 2003). The fact has shown that there is little understanding of the wide range of values that protected areas contribute to Vietnam's development (ICEM, 2003). Thus, understanding the relationships between forest resources in protected areas and local communities will contribute to facilitate the process of sustainable forest management as well as to improve local livelihoods in mountainous areas in Vietnam.

This research, therefore, was carry out to evaluate the contribution of forest resources to rural livelihood of the communities living inside and around Thuong Tien Nature Reserve (NR), Kim Boi district, Hoa Binh province based on two criteria: distance to forest (from household to forest) and household economics types.

Methodology

Study area

The research was conducted at Thuong Tien NR which covers an area of 7,300 hectares located in 3 communes including Thuong Tien, Kim Tien commune of Kim Boi district, Quy Hoa commune of Lac Son district, Hoa Binh province, Vietnam. Thuong Tien NR belongs to the administrative region of Hoa Binh province which is located in the northwest of Vietnam (Figure 1). The inhabitants living in and around Thuong Tien NR are mostly Muong ethnic group, accounting for 97% population. Traditionally, the local people's life depends mainly on forest resources in Thuong Tien NR for many years.

Methods

The applied methods in the research include analysis of secondary data and survey using Participatory Rural Appraisal (PRA) tools. A household survey (one hundred sixteen households) was conducted in 3 communes: Thuong Tien, Kim Tien of Kim Boi District and Quy Hoa of Lac Son District, Hoa Binh Province. The interviewed households must be representative of the study area according to criteria including distance to the forest and type of household economy. Data gathered was analysed using SPSS software. Particularly, to quantify the relationship between the total income of households and the income from forest and forest land, the research analyzed all correlations using SPSS software to select an appropriate recurrent equation. The contribution of forest resources to total income of local household was presented by the function: Y= F(X) with the dependent variable (Y) that is the total income of the household and independent variable (X) that is the income from forest and forest land. The selected equation indicated the percentage of fluctuation of the household's total income which is clarified by the recurrent equation.

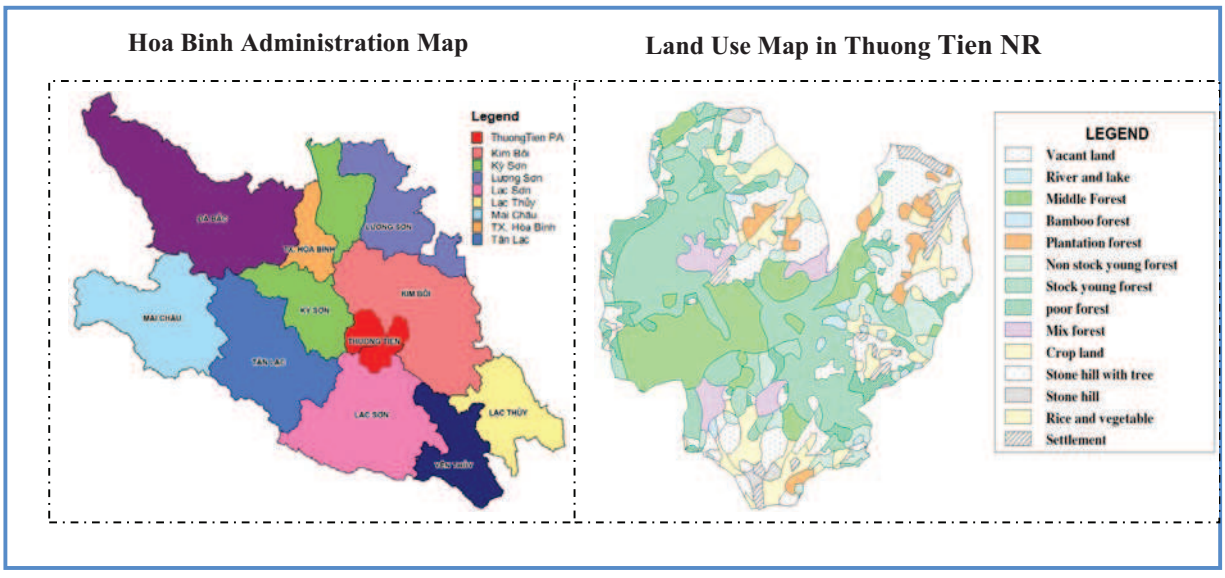

Figure 1. Case study location

Results and Discussion

Forms of extracting forest resources by local people

To date, there are three approaches to livelihood of residents living inside or around Thuong Tien NR: (1) People develop agricultural production including wet rice cultivation and livestock; (2)

People find sources of livelihood in other areas or trading; (3) People collect products from forest and forest land. The results showed that the major livelihood source of residents living inside or around Thuong Tien NR is from the exploitation of forest resources, namely timber, fuel-wood, bamboo and medicinal plants. Additionally, grazing in the protected area is also importantly contributing to the local livelihood.

Timber extraction: Local people inside and near Thuong Tien NR extracted timber to meet their two demands including for subsistence (material for constructing houses and house furniture) and for sale. Main extracted timber types were *Peltophorum pterocarpum*, *Chukrasia tabularis*, *Mimusops elengi*. According to the interview results, local households of good living standard inside the strictly protected area extracted timber on an average of 3.43m^3/household/year for subsistence and 3.96m^3 for sale (Figure 2).

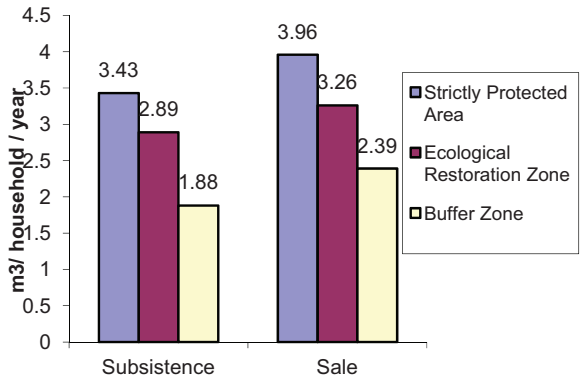

Figure 02.Timber extraction for daily life and for sale regarding the household's position

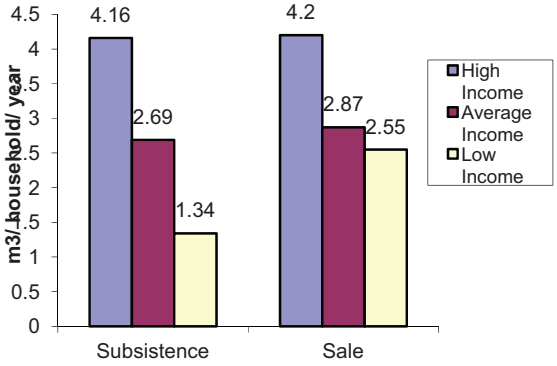

Figure 03.The level of timber extraction for daily life regarding household economy

Fuel wood extraction: In the study area, fuel wood was collected for cooking, wine processing, castle grazing and for sale. Local households living in the strictly protected area extracted approximately 6,559 kg/household/year of fuel wood for those daily activities. On the other hand, the highest proportion of fuel wood extracted by the local households for sale was in the buffer zone of Thuong Tien NR at about 3,400 kg/household/year (Figure 4). Households with good living standard were those who used fuel wood most whereas poor households mainly harvested fuel wood for sale, 6,061 kg/household/year and 3,900 kg/household/year, respectively (Figure 5).

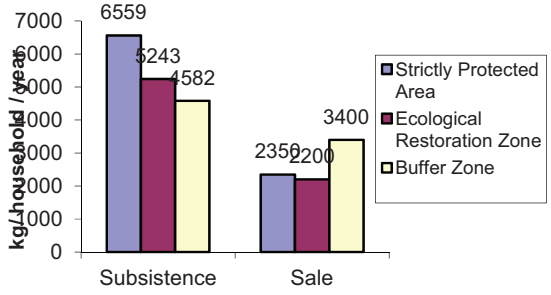

Figure 04.The level of fuel wood extraction based on the household's position

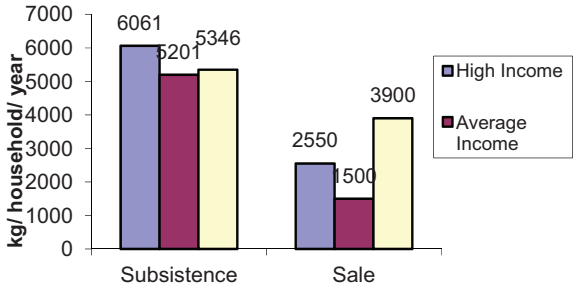

Figure 05.The level of fuel wood extraction for daily life based on household economy

In the study site, non-timber forest products play a very crucial role in local households' life, especially those who live in the nature reserve and its buffer zone. Local people collected some major non-timber forest products, including bamboo, bamboo shoot, rattan, honey, and mushroom. Particularly, bamboo shoot was an important kind of food in local household's life. On average, one household in the strictly protected area extracted approximately 6,488kg of bamboo shoot per year.

Castle grazing in the forested area of Thuong Tien NR is the traditional habit of local households. There were two ways of grazing: controlled ox/buffalo grazing and free grazing. On average, each household has 0.75 - 2.89 buffalo/ox freely grazed in the nature reserve.

Contribution of forest resources to livelihood of local people

This study focused on the important contribution of forest resources to total income of the local households with respect to the distance from household to forest and household economics types

Contribution of forest resources to total income of local household regarding the household's position from the NR

The survey result on the relation between the total income of households and the income from forest and forest land yielded the interrelate equation presented in Table 01.

Table 1. The interrelate equation on the contribution of forest resources to total income of household regarding the position

No	Position from the NR	R2	Interrelate equation
1	Strictly protected area	0.787	LnY=3.489+0.698LnX (1)
2	Rehabilitation zone	0.739	LnY=4.071+0.636LnX (2)
3	Buffer zone	0.492	LnY=4.453+0.605LnX (3)

In the strictly protected area and rehabilitation zone, the income from forest and forest land significantly contributed to the total income of households, which was presented in the equivalent identified coefficient $R^2 = 0.787$ and $R^2 = 0.739$. In the buffer zone, the total income of households had a close relation with the income from forest and forest land, which is presented in the coefficient $R^2= 0.492$. In other words, 78.7 % of fluctuation of the household's total income in the strictly protected area was explained by the income from forest and forest land shown in the interrelate equation (1). In the rehabilitation zone, 73.9 % of fluctuation of the

household's total income was explained by the income from forest and forest land shown in the interrelate equation (2). However, only 49.2% of fluctuation of the household's total income in the buffer zone was from the forest and forest land as shown in the interrelate equation (3). The analyses showed that the nearer people live to the forest the more important forest resources were to total income.

Contribution of forest resources to total income of local household regarding household economy

The study results have shown that household economy types were also responsible for the difference of contribution of forest resources to total income of local household, which was summarized in table 02. .

Table 2. The interrelate equation on the contribution of forest resources to total income of household

No	Household economy	R2	Interrelate equation
1	Households of good living standard	0.375	LnY=6.578+0.404LnX (4)
2	Households of medium living standard	0.474	LnY=6.601+0.378LnX (5)
3	Poor household	0.560	LnY=1.158+0.913LnX (6)

The results on Table 03 showed that there was an average correlation between the poor household's total income and the income from forest and forest land, which was presented on the identified coefficient R^2= 0.560 and the interrelate equation(6). It means that 56% of fluctuation of the poor household's total income was from forest and forest land as shown in the interrelate equation (6).

There was a fairly close relationship between the total income of households of medium and good living standard, which was shown in the identified coefficients of R^2 = 0.474 and R^2 = 0.375 and the interrelate equation (5) and (4), respectively. This means that 47.4% of fluctuation of the total income of households with medium living standard was attributed to income from forest and forest; 37.5% of fluctuation of the total income of households with good living standard was from forest and forest land. Therefore, it was clear that poor households in the study site were more dependent on forest resources than the higher income ones.

Recommendations

In short, forest resources played a crucial role in livelihood of communities at Thuong Tien NR. However, the benefits of forest will also create motivations for local communities to exploit forest resources uncontrollably. To contribute to the implementation of both conservation and livelihood development objectives, the research also applied the matrix Win-Lose of Sunderlin (2003) to recommend some solutions which combines household economy development and effective management of forest resources (Table 3).

Table 3. Solutions of Win-Lose Model

Win – Win *Household economy development and effective management of forest resources*	**Win – Lose** *Household economy development but not effective management of forest resources*
- Develop biogas models - Encourage forest plantations, forest protection - Grass plantation for husbandry - Develop the model of planting rattan under forest coverage. - Plant *Chukrasia tabularis + Edible canna*	- Training on sustainable bamboo shoot extraction. - Develop forest plantations - Develop ecotourism - Use fuel - efficient stoves
Lose – Win *Effective forest resource management but household economy isn't developed*	**Lose – Lose** *Household economy is not developed and forest resource is reduced at the same time*
- Plan castle grazing areas - Use Concrete houses instead of wood houses	

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