Willingness to Accept Compensation for Forest Protection: A Case study in Dinh Hoa District, Northern Vietnam

Thi Thanh Ha Nguyen[*], Michael Köhl, Prem Raj Neupane

World Forestry, Center of Wood Sciences, University of Hamburg, Leuschnerstr.91, D-21031 Hamburg, Germany

Abstract

Setting up protected areas in order to combat tropical deforestation and biodiversity conservation has been widely practiced. In order to balance individual well-being and habitat preservation and to encourage the involvement of local people in protecting natural resources, direct payment is an effective way to compensate the cost of resource maintenance. Direct payments to households which are contracted or leased to protect natural forests have been implemented in Vietnam since 1998. However, the payment of VND 100,000/ha/year (US$ 4.8) is insufficient to fully compensate opportunity costs of forest management and thus, does not motivate the households to manage forest in a sustainable way. In a case study in Dinh Hoa district, we have undertaken a contingent valuation exercise to understand the local social patterns and income structures that are decisive on developing an influencing incentive regime, and to estimate the willingness to accept the compensation for natural forest protection.

Key words: Contingent valuation, natural forest protection, willingness to accept

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[*] Corresponding author´s email: ha.nguyen.tnu@gmail.com

1. Introduction

Although the rate of deforestation slightly decreased in the 2000s compared to the 1990s, it is still alarming in many countries, especially in tropical regions where the loss of forest is the highest (FAO, 2010; Barbier, 2007). Subsistence farming, commercial farming, logging and fuel wood removal have been identified as direct causes of deforestation (UNFCCC, 2007). According to Kissinger et al. (2012), commercial and subsistence agriculture are the proximate drivers and account for approximately 80% of global deforestation. Effects of tropical deforestation on climate change, biodiversity conservation, and environment are a serious global concern since early 1990s. It is widely accepted that decreasing tropical deforestation is the most essential and cheapest alternative for mitigating global warming.

Setting up protected areas such as national parks and reserves is a common practice for combatting tropical deforestation and biodiversity conservation. The area of forest where biodiversity conservation is designated as its primary function increased by more than 95 million hectares between 1990 and 2010 (FAO, 2010). On the other hand, consistently growing populations exacerbate the problem of food security and result in increasing land use for subsistence and commercial agriculture. Limited land resources and contradicting users' interests resulted in substantial conflicts in several parts of the world and seriously affected the livelihoods of local and indigenous communities in the vicinity of protected areas (MEA, 2005).

In 2010, Vietnam had a forest area of over 13 million hectares (ha), which is more than twice of the country's forest area in late 1940s (FAO, 2010). In Vietnam, forests are assigned to three forest utilization types that depend on the designation forest uses. The definition of three types of forests is given in Box 1. The use-rights and obligations of households differ according to the contracted forest type (Box 2).

BOX 1 FOREST CLASSIFICATION

1/ Production forests are mainly used for production and trading of timber and non-timber forest products in combination with protection, contributing to environmental protection. Production forests include:

a. Natural production forests;

b. Planted production forests; and

c. Seeding forests, including the selected and recognized planted forests and natural forests.

2/ Protection forests are mainly used to protect water sources and land, prevent erosion and desertification, restrict natural calamities and regulate climate, thus contributing to environmental protection. Production forests include:

a. Headwater protection forests;

b. Shielding protection forests, and

c. Protection forests for environmental protection.

3/ Special-use forests are mainly used for conservation of nature, specimens of the national forest ecosystems and forest biological gene sources; for scientific research; protection of historical and cultural relics as well as landscapes; in service of recreation and tourism in combination with protection, contributing to environmental protection. Production forests include:

a. National parks;

b. Nature conservation zones, including nature reserves and species-habitat conservation zones;

c. Landscape protection areas, including forests of historical or cultural relics as well as scenic landscapes; and

d. Scientific research and experiment forests.

Source: Vietnam Government (2004)

BOX 2 BENEFIT SHARING AND OBLIGATION OF FOREST CONTRACTED/ALLOCATED HOUSEHOLDS FOR PROTETION

1/ Households allocated special use are not allowed to harvest anything from forests.

2/ Households allocated protection forest can harvest timber not exceed 20% of total stand by selective cutting or not exceed 10% of basal area when forest are allowed to harvest. They can harvest bamboo not exceed 30% when bamboo forest cover reach 80%. They are allowed to collect deadwood and non-timber forest products (NTFPs).

3/ Households allocated production forests are allowed to undertake agroforestry practice. They can harvest 100% from poor regeneration forest, 70-80% regenerated forest after shifting cultivation, and 95% of bamboo forest. They can collect deadwood, harvest timber not exceed $10m^3$ to construct house.

Households contracted production forests can use by-products during silviculture treatments, interplant, graze cattle, benefit 1-2% of timber each year when forest reach harvesting age.

Source: Prime Minister (2001)

During the period from 1998 to 2006, the annual payment for natural forest protection was VND 50,000/ha (US$ 2.4). Although the amount of payment increased to VND 100,000/ha/year (US$4.8) in 2007, it is too low in term of labor cost, and did not adequately compensate forgone alternative uses. The payment is equal to 1-2% of household´s incomes (Wunder, 2005), and not attractive enough for the people to participate in the protection program in the long term.

A major question concerning the adequate level of payments for individual household is its dependency on households' income, structure and utilization patterns. The current study presents an assessment of those factors for a case study in Dinh Hoa district, Vietnam.

2. Materials and methods

2.1. Study site

Dinh Hoa is a district of Thai Nguyen province, located in Northeastern Vietnam, and has total land area of about 52,000 ha. The district consists of one town and 23 communes with a population of 87,000 people living in about 21,000 households and belonging to nine ethnic groups (TSO, 2012). Dinh Hoa is one of the poorest districts in Thai Nguyen province where more than 70% of labor force is employed in the agriculture sector.

Forest area covers about 30,000 ha, representing 58% of total land area in the district. Half of the forest area is covered by natural forests which are substantially degraded and fragmented (ATKFMB, 2013). As many other mountainous districts in Northern Vietnam, the forests in Dinh Hoa have been over exploited since several decades. The major reasons for the forest destruction in the district are poor and passive management, conversion of forest lands into other land use, illegal logging, and slash-and-burn agriculture (Thai Nguyen Province Committee, 2007).

Starting in 1992, local households were allocated and contracted forests for management and protection. Approximately 7,000 households held more than 22,000 ha or 70% of the forestland, and the remaining 30% stayed under the management of village communities, commune committees, or the forest management board. A survey was conducted among local households, which manage more than two thirds of forestlands, to understand the local voice and choice toward the payment policy.

We conducted a contingent survey including 300 randomly selected households from 6 communes in Dinh Hoa district in order to identify difference in their attitudes related to the three types of forests.
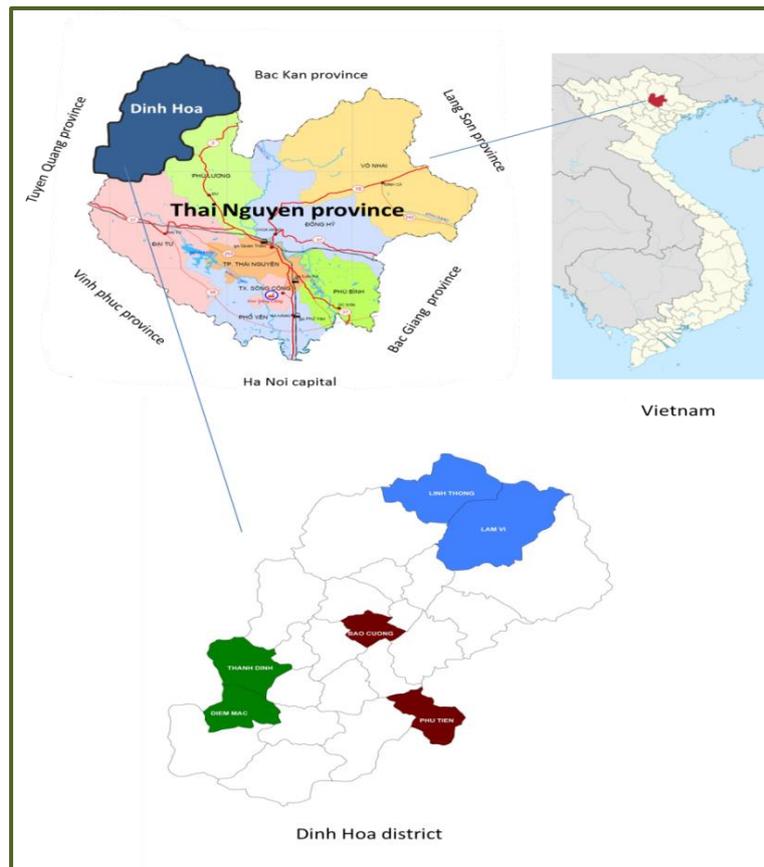
Figure 1: Study site

2.2. Method

CV method emerged as major tool widely used in cost-benefit appraisal and environmental impact assessment in environmental economics (Mitchell & Carson 1989; Bateman, 2004; Bateman et al., 2004; Pearce et al., 2006), in both developed (Pearce et al. 2006) and developing countries (Pearce et al., 2002). Being an established preference technique, CV is a survey or questionnaire – based approach to obtain the monetary valuation assignment on non-market goods and services under hypothetical markets described in the survey scenario. In developing countries, CV was commonly applied in areas such as water supply and sanitation, recreation, tourism, national park management and biodiversity conservation (Whittington, 1998). Whittington (2010) reports on hundreds of stated preference studies conducted in developing countries over two past decades.

Willingness to accept (WTA) studies conducted by Shyamsundar & Kramer (1996) and Minten (2003) in Madagascar showed the successful application of CV method for protecting tropical forest in developing countries contexts. In Vietnam, Bui & Hong (2008) performed WTA survey in Central Vietnam to implement sustainable forest management while Trinh & Rañola (2011) undertook a similar study in the northwest mountainous region to assess upland farmers' WTA to participate in forest management.

In this study, we performed a WTA survey, using a double-bounded dichotomous format, to debrief the local WTA the compensation for natural forest protection. A logit model was used to estimate the parameters of explanatory variables. These variables describe the demographic characteristics of households as well as the characteristics of the forest, i.e. distance, forestland area, forest products. Details can be founded in Nguyen (2015).

3. Results

Among the 300 households interviewed, 23 people (8%) objected the contingent valuation questions. These responses were treated as non-responses, leaving a total response rate of 92% (277 households). The respondents' distribution on the three forest utilization types are shown in Figure 2.
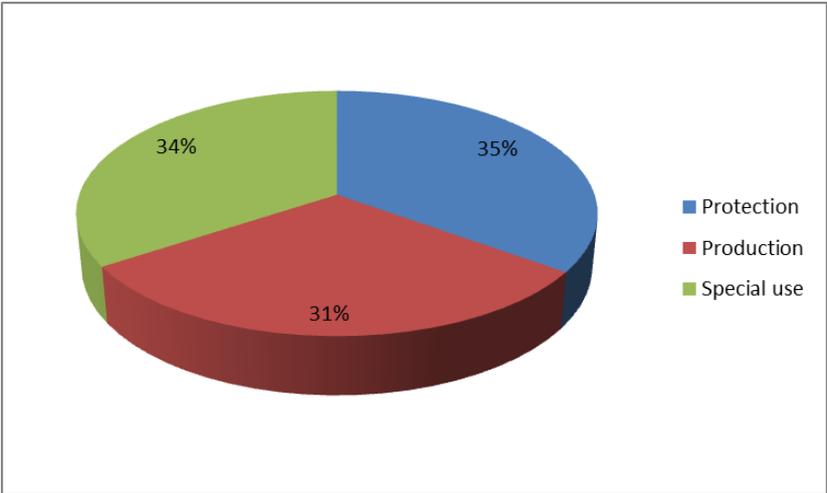

Figure 2: Distribution of respondents in relation to the three forest utilization types [%]

Table 1 describes the assessed household characteristics. The major occupation of the respondents is agriculture. Their education is quite low; the average class is 7. They are 48

years old on average; more than half of whom are female. More than 80% of respondents are belonging to ethnic minorities and are living in families of an average size of 4 people. To each household more than 3 ha of natural forest contracted of which 73% were allocated to both natural forest and planted forest. Among the total forest area per household, the designated functions "protection forests" occupied the highest share and "production forest" the lowest percentage. The average forestland of 3 ha/household or even less is found in many studies, including Lam Dong, Bac Kan, Son La (Pham et al., 2013; Trinh & Rañola, 2011; Dam et al., 2013) Hue, Ha Giang, Quang Nam, and Yen Bai (Wunder, 2005). The average distance from houses to the nearest natural forest is nearly 2 km. All households stated that their natural forest is currently degraded with low growing stock.

Table 1: Description of households' characteristics

Variable	Total		Production		Protection		Special use	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
AGE (years)	47.94	11.59	46.93	11.19	46.16	12.23	50.64	10.89
GENDER (Male =1)	0.62	0.49	0.56	0.50	0.65	0.48	0.63	0.48
EDUCATION (class)	7.43	2.29	7.35	2.14	7.85	2.52	7.08	2.13
ETHNIC („Kinh" group = 1)	0.19	0.40	0.13	0.34	0.33	0.47	0.12	0.32
HHSIZE (persons)	4.27	1.47	4.24	1.35	4.48	1.58	4.08	1.46
INCOME (VND million)	50.23	35.84	51.61	31.12	58.52	45.41	40.52	25.16
F_LAND (ha)	3.43	4.99	0.75	0.41	6.37	7.00	2.81	2.64
F_PLANTED (Own planted forest =1, No = 0)	0.73	0.44	0.85	0.36	0.81	0.39	0.55	0.50
DISTANCE (km)	2.34	2.02	2.07	1.55	2.79	2.52	2.11	1.73
FUELWOOD (collected =1, No =0)	0.98	0.13	0.95	0.21	1.00	0.00	0.99	0.10
BAMBOO (collected =1, No =0)	0.74	0.44	0.53	0.50	0.87	0.34	0.79	0.41
PALMTREE (collected =1, No =0)	0.45	0.50	0.60	0.49	0.35	0.48	0.43	0.50
n =	277		85		97		95	

98% of households collected fuel wood, 74% collected bamboo, and 45% collected palm trees from natural forest; none of them collected timber from the natural forest during the last 12 months. Approximately 90% of collected fuel wood, timber and bamboo are utilized

for self-consumption. Palm tree products such as palm leaf for house roof constructing, and palm vein and palm stem for sale are collected in reasonable quantity. The main crop harvests are rice, maize, cassava and tea. All households cultivate rice. In addition 40% cultivate maize, 43% crop cassava, and 54% cultivate tea. The mean rice production of 2.3 tons per household is considered to be sufficient for self-consumption; harvested maize and cassava are used as fodder for livestock. The average size of agriculture land holdings is 0.27 ha per household. Because agriculture land is quite low, the local people cultivate maize, cassava and tea in the lowland forest. Tea is a traditional plant in this region and contributes considerably to household incomes. Table 2 presents the forest products collected and crops harvested per household during the last 12 months.

Table 2: Forest products and crops harvested per household in 2012

Variable	Unit	Min.	Max	Mean	Std. Dev.
Forest products					
Timber	m3	0.00	100.00	3.18	11.75
Fuelwood	m3	0.00	520.00	26.84	44.84
Bamboo shoot	Kg	0.00	3000.00	110.16	350.92
Bamboo (*Dendrocalamus latiflorus*)	Culm	0.00	400.00	17.18	42.99
Bamboo (*Bambusa nutans*)	Culm	0.00	12000.00	162.53	845.19
Bamboo (*Schizostachyum aciculare*)	Culm	0.00	1000.00	26.75	94.21
Palm_leaf	Leaf	0.00	4000.00	131.01	505.23
Palm_vein	Kg	0.00	7000.00	146.92	551.30
Palm_stem	1,000 pcs	0.00	300.00	11.44	38.16
Main crops					
Rice	Kg	300	7500	2303.94	1236.521
Maize	Kg	0	4000	133.3	377.033
Cassava	Kg	0	17000	332.22	1311.569
Tea	Kg	0	5000	213.99	433.802
n= 277					

The average annual total household income is estimated to be VND 50 million (US$2,400) of which agricultural and cash crops show the largest share, and livestock shares the smallest (Table 3). The highest contribution to total household incomes is obtained from agricultural crop, followed by other income sources (such as remittance, pension, and small household enterprise etc.), income from forest, and income from livestock. The annually average income per capita is around US$500.

Table 3: Household income contribution

Household income contribution	VND million	Proportion
Forest	10,536.08	0.21
Crop	15,990.58	0.32
Livestock	9,542.41	0.19
Other	14,215.88	0.28
Total	50,284.95	1.00

The acceptance of compensation level is different between the households who are contracted different types of forest. The mean WTA of households contracted production forest is higher compares to the mean WTA of the households contracted protection and special use forest. Overall, the annual mean WTA of households contracted natural forest for protection is estimated to be VND 372,000 (US$18) per ha. Multiplying this amount of payment by the total forest land contracted to local households, the annual cost of natural forest protection in Dinh Hoa is VND 4.63 billion (US$ 220,307).

4. Conclusion

Households in Dinh Hoa to which forests were contracted/ allocated are found to be poor and rely heavily on agriculture cultivation. The annual income per capita is estimated to be US$500 which is significantly lower than the average annual income in Thai Nguyen province (TSO, 2012). Several households generate income from harvesting round wood from planted forest. Assuming a rotation period of 8-10 year, the average annual income from planted forest does not significantly contribute to the total annual income of the households. Nearly 100% of the households use fuelwood for cooking, boiling water and heating, especially in the winter season. The considerably high prices for other energy sources such as electricity

and gas make them less affordable for rural people. Most of the agricultural and forest products collected are used for subsistence purposes.

The mean WTA of US$ 18 is four times higher than current payment made available by the government for forest protection. This empirical assessment suggests an amendment of the current payment policy to meet the local households 'expectations.

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