

ENVIRONMENTAL LEASE SERVICES FOR ECOTOURISM BUSINESS IN CAT BA NATIONAL PARK, VIET NAM

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SUMMARY

The paper addressed on solving a very important issue concerning environmental lease for implementing ecotourism business. The study answered following questions: (i) How are competitive advantages of environmental lease locations? (ii) How much is the price of environmental lease for ecotourism business? And (iii) Which group of environmental lease locations can be formed? Two main methods were applied in the study including willingness to pay (WTP) and fuzzy regression (FR). The results from 22 environmental lease locations in Cat Ba national park, Hai Phong city, Vietnam, with data collected in 2014 showed that, total area for leasing is 413.5 ha including 250.5 ha of forests, 15.4 ha of non-forested land, 38.7 ha of orchard, 5.0 ha of sandy land and 103.9 ha of surface water area. Competitive advantages of environmental lease locations were described by 8 parameters. Price unit for leasing fluctuates from 0.77 to 19.98 million VND per hectare per year. Price unit for leasing is higher than for contracting from 1.3 to 2.5 times. Based on amount of money for leasing environment, locations were divided into four groups. With results have been achieved from the study, the paper contribute to suggesting of enhancing land use value and environment protection effectiveness for Cat Ba national park in Vietnam.

Keywords: Cat Ba national park, ecotourism business, environmental lease, fuzzy number, fuzzy regression model, price of environmental lease.

I. INTRODUCTION

Environmental service development is a promising orientation to link conservation with developing and enhancing the value of ecosystems. Nowadays, environmental service is a factor to regulate relationships and share interests among stakeholders; in which forest and marine environmental lease activities for ecotourism business are concerned in many places, particularly in special use forests such as Cat Ba National Park. The environmental lease is a way to include consideration for the public interest (environmental protection) into contract law. It is therefore limited to specific owners or areas (Wunder and Sven, 2005; Dominic Moran, *et al* 2012).

Cat Ba National Park has a rich, attractive and unique ecotourism resource with the harmony of the natural scenes as forests and sea, mountains and caves, canyon lands and valleys, limestone islands and slough, tides and corals, golden sunlight and sands, Cat Ba

langur, *Nageia fleuryi* populations and lakes in the mountains. Cat Ba National Park is also located in the focal economic triangle area of the North: Hanoi - Hai Phong - Quang Ninh, and it belongs to the Ha Long bay, known as the World Natural Heritage area. With these attractions and advantages, ecotourism provides the opportunity of high economic efficiency and becomes a factor that conserves the environment of Cat Ba National Park. However, ecotourism activities in Cat Ba National Park are facing to difficulties and existing many shortcomings, namely:

- Although Cat Ba is great potential of developing ecotourism, currently there is a small contribution of ecotourism in revenues of Cat Ba National Park, just 1 billion VND year⁻¹. Ecotourism service is generally poor, simple and does not meet the demands and satisfaction of tourists. Surreptitious exploitation of ecotourism resources of local people and businesses to have profits is as well occurring.

- There is a lack of resources to meet the ecotourism demand. By Decision No 2119/QĐ-UBND dated 04/12/2012 by Hai Phong People's Committees decided about the scheme for ecotourism development in Cat Ba National Park; need for capital source up to 2020 is very large (>300 billionVND), the state budget is not able to come up for these costs.

- There is no suitable mechanisms or policies in attracting businesses and private companies that invest in environmental lease, such as: undetermined lease size, lease period, severity of the impacts and responsibility to protect, embellish environment and landscape; especially is not determined the price of environmental lease as well as the payment method between the parties. This limitation is one of the reasons that make "socialization" level on environmental service payment in Cat Ba National Park slow and less efficient.

To contribute to solving the above mentioned short comings, the study has been compiled to clearly determine the location advantages, price to lease and divide locations into some groups.

II. METHODS

2.1. Study site

Cat Ba National Park is located at 20°44' - 20°52' North latitude and 106°59' - 107°06' East longitude, about 150 km southeast from Hanoi. Cat Ba is the gateway of Hai Phong city and a center of biodiversity, geology, natural scenery, tourist of the city.

The land area of Cat Ba National Park is 16196.8 ha, with island area of 10931.7 ha and the sea area of 5265.1 ha. The park is divided into three functional zones: Strict protection zone with 4,914.6 ha; Ecological restoration zone with 11094 ha; Administration and service zone with 93.1 ha.

According to Decision No. 2119/QĐ-UBND on December 4, 2012 of the President of Hai Phong People's Committee about approving the Scheme on ecotourism development in Cat Ba National Park, there are 22 locations that have been identified in need of using land for ecotourism development. The total area of leased premises (include both land and sea surface) of 22 locations is 413.5 ha (250.5 ha of forests, 15.4 ha of non-forested land, 38.7 ha of orchard, 5.0 ha of sandy land and 103.9 ha of surface water area). Environmental lease locations and area are shown in Figure 1.

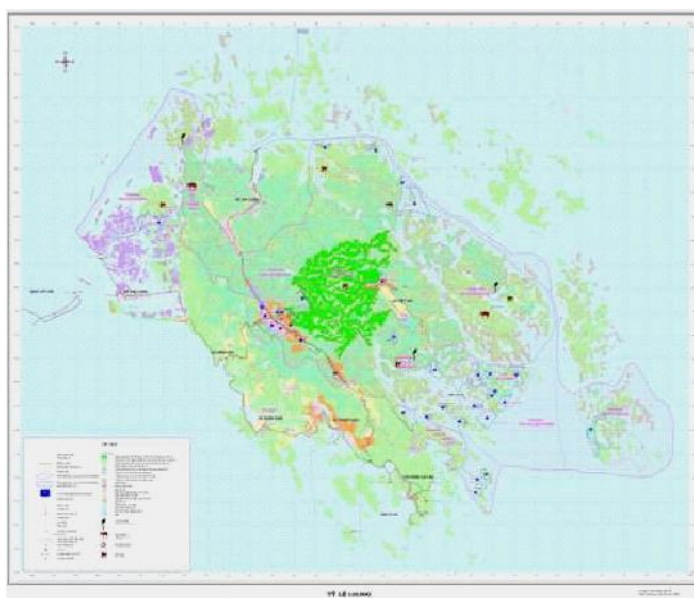


Figure 1. Map of environmental lease locations in Cat Ba National Park

Among locations for leasing, there are three, five and fourteen locations in the strict protection zone, administrative and service zone and ecological restoration zone, respectively.

The area of impact is the area that is allowed to build construction items and technical infrastructures. According to point 6 of Circular No. 99/2006/TT-BNN about guiding a number of articles of forest management regulation, promulgated together with Decision No. 186/2006/QĐ-TTg on 14/08/2006 of the Prime Minister.

2.2. Data approach

Environmental lease area includes land area and sea surface area. Investors are required to carry out construction engineering works under the provisions of the State; as well they will be responsible for resources protection and fire prevention and fighting all over the assigned area.

Based on natural and socio-economic conditions, the importance of each location and the extent of impact, targets have been set up in order to determine indexes to identify the price for each area by using fuzzy math, such as "fuzzy number" and "fuzzy regression".

2.3. Data collection

Due to different characteristics, advantages and limitations of the lease places, the exploitation of the places will be conducted at different impact levels, environmental lease price has to be calculated for each place.

In order to determine the environmental lease price assigned to each place, the study clearly describes the purposes and development orientations for each place. The total places have been investigated were 22. In each place, 10 key informants (Park staffs, local people and businessman) were interviewed by using questionnaire forms. The questionnaire form is used to investigate

including 7 parameters, of which 6 parameters namely Land area of each location (size of the lease area); Attraction level to tourists; Service diversification level; Convenience level, conditions for reducing transport costs; Connection level with other tourism places and Level of investment attraction for businesses and private - reflect the characteristics, potential, and advantages of the lease area and 1 parameter reflects the "willingness to pay" level for environmental lease to develop ecotourism. The 7th parameter is classified as subjective factor being related to the purpose of socialization, management conditions and environmental lease priorities of Cat Ba National Park in the conservation of forest resources and biodiversity. This factor is evaluated in three levels (level 1 - low priority, level 2 - medium priority, level 3 - high priority). Thus, there are 7 factors that control the environment lease price. Besides, 8th parameter is the price unit or environmental lease price, which synthesizes and reflects competitive advantages of each environmental lease place.

2.4. Data analysis

By taking the total amount of "willingness to pay" (VND/lease location year⁻¹) and subtracting the total amount of sea surface lease (is assigned and less volatile by location), and then dividing it by the total land area, we determined the price unit to lease land at each place (total of 22 locations).

Among the 22 locations in the area that are planned for environmental lease, there are 10 places that are "allocated" with the deal price between Cat Ba National Park and businesses. According to previously explained calculations, we will determine the "allocated" price unit for land in each specific location.

Using the method of fuzzy regression analysis between "willingness to pay" price

unit and the 6 parameters, which will test the suitability and reliability of the data, the price unit and environmental lease price can be determined for any place.

- Model 1: includes 10 pairs of data (corresponding to the number of allocated places). Through this model, the relationship of the allocated price unit can be determined (G1) with 6 main influenced parameters.

- Model 2: includes 22 pairs of data (corresponding to the number of places in environmental lease plan). Through this model, the relationship of “willingness to pay” price unit (G2) can be calculated with 6 main influenced parameters.

Fuzzy regression model is written as follows (Tanaka *et al*, 1982 ; Chang *et al*, 2001):

$$\hat{Y} = \bar{A}_0 + \bar{A}_1 X_1 + \bar{A}_2 X_2 + \dots + \bar{A}_n X_n \quad (1)$$

In which, Y is the dependent variable (the cost to lease for a year),

$\bar{A}_i = \langle a_{ic}, a_{iw} \rangle$ are the fuzzy coefficients, X_i is the explanatory variable (6 parameters). X_i and Y_i are real data or fuzzy data. In this paper, all input and output data are fuzzy data, the structure of regression model is also

fuzzy. Each coefficient \bar{A}_i is represented by a fuzzy membership function that is triangle, formed as $f = (\alpha, \beta, \gamma)$. In which, $\alpha \in \mathbb{R}$ is the center (or mode), β and $\gamma \in \mathbb{R}$ respectively are spread on the left or right. The fuzzy membership function that is triangle is represented as (Kao *et al* (2003); Cengiz Kahraman *et al* (2006):

If $\omega \geq \alpha (\gamma \geq 0)$

If $\omega \leq \alpha (\beta \geq 0)$

$$\mu_f(\omega) = \begin{cases} L\left(\frac{\alpha - \omega}{\beta}\right) \\ R\left(\frac{\omega - \alpha}{\gamma}\right) \end{cases} \quad (2)$$

L, R are identified functions on the left and right of the fuzzy and satisfy with the

conditions: $L(\omega) = L(-\omega)$, $R(\omega) = R(-\omega)$; $L(0) = 1$, $R(0) = 1$. The fuzzy coefficients are identified by fuzzy least squares method (FLSM) by SAS software.

The accuracy of the fuzzy regression model was assessed by three criteria: (i) Euclidean distance (D), (ii) the relative difference of fuzzy range (RDS,%), (iii) the relative difference between 2 centers of the theory fuzzy and empirical fuzzy ($RD\alpha$,%). The smaller D, RDS and $RD\alpha$ are, the more likely is the fuzzy regression model (Pham Van Dien *et al*, 2013), the “willingness to pay” price to lease environment will be more asymptotic with realistic prices.

Based on the results of the fuzzy regression model G1 and G2 are identified. G2 is the basic for determining the environmental lease price unit (weight is 2), G1 is used for the adjustment of the lease level in case of $G2 > G1$ (weight of G1 is 1). The adjusted price (G3) is identified as:

$$G3 = (G1 + 2G2) / 3 \quad (3)$$

Therefore, the official price for environmental lease depends on the 7th factor (discount factor) and will be adjusted. Since G3 is a fuzzy number, the official price unit will be:

+ Places for leasing environment in 1st priority: take the upper value of G3.

+ Places for leasing environment in 2nd priority: take the middle value of the G3.

+ Places for leasing environment in 3rd priority: take the lower value of G3.

Based on the volatility of the price unit for leasing environment, we will classify places according to the leasing money into 4 groups (ranked from high to low).

* The environmental lease duration

- Forest Environment: Maximum of 50 years. Where the lease duration ends, if investors want to extend lease duration, they will have to report Hai Phong city People’s

Committee to consider and decide.

- Sea surface: Maximum of 5 years. Where the lease duration ends, if investors want to extend lease duration, they will have to report Hai Phong city People’s Committee to consider and decide.

III. RESULTS AND DISCUSSION

3.1. Competitive advantages of environmental lease locations

Competitive advantages of each environmental lease location are a general indicator that mainly influences the environmental lease price and it is evaluated through 8 factors as mentioned in above section. The first 6 factors objectively reflect the potentials of each location, the 7th factor reflects the preferential level about pricing in environmental lease and also represents the opinion that link resources management with services business activities. 7 above mentioned parameters have been assessed with points are fuzzy numbers (for example 4.3 - 5.2). The 8th factor is a general indicator reflecting the competitive advantages of each location.

- Attraction level to tourists: from 4.3 - 5.2 to 7.6 - 8.5 points.
- Service diversification level: from 3.6 - 4.5 to 8.6 - 9.4 points.
- Convenience level, conditions for reducing transport costs: from 3.8 - 4.3 to 7.6 - 8.4 points.

- Connection level with other tourism places: from 3.3 - 4.4 to 7.4 - 8.5 points.
- Level of investment attraction from businesses and private: from 4.3 - 5.6 to 7.5 - 8.4 points.
- Size of the lease area: from 1.8 - 2.7 to 6.8 - 7.5 points.
- Preferential level: from 1 to 3.
- Willingness to pay for price unit (million VND/ha/year): from 0.48 - 0.80 to 17.2 - 21.6.

3.2. Environmental lease price unit and amount of money

The paper has been selected fuzzy regression model between land lease price (G) unit with 6 parameters that have important influence. Since it has identified 7 parameters of the fuzzy regression model are a, r, s, b, d, g, h and 3 criteria to evaluate model are D, RDS, RD α . Overall, all 3 criteria to assess model have smaller values (D = 0.2, RDS = 14.5% and RD α = 5.9%), suggesting that this model has high accuracy (Table 1). Environmental lease price is reflected by 2 criteria: the price unit and the lease amount. The price unit is determined by the average amount of money for lease 1ha of land or water surface within 1 year (VND/ha/year). This amount is determined to lease entire area of a certain location (VND/location/year).

Table 1. Parameters and criteria to assess regression model between G and influencing factors

Parameters of the fuzzy regression model (FRM)							
N	a	r	s	b	d	g	h
0	-16.4402	-1597.54	1633.997	0.008516	0.163346	0.008447	0.164635
1	0.123428	1314.869	-1287.92	Assess model			
2	7.824705	-457.476	416.3277				
3	0.329837	1307.805	-1202.04	D		RDS (%)	RD α (%)
4	11.19201	-626.715	578.4132	0.2		14.5	5.9
5	-18.4632	561.7486	-554.082				
6	0.243003	1327.729	-1402.94				

From this model, we have identified money (Table 2).
environmental lease price unit and amount of

Table 2. Environmental lease price unit and amount of money

No.	Locations	Preferential level for environmental lease	Price unit for lease land (million VND/ha/year)	Amount of money for lease location (million VND/ha/year)
1a	Khe Cau lycheehill	2	2.75-3.5	11.0-14.0
1b	Nga Ba lychee hill	3	2.50-2.75	30.0-33.0
1c	<i>Nageia fleuryi</i> forest	1	2.33-2.6	23.3-26.0
1d	Ms Huyen's garden house	1	1.90-2.23	15.2-17.8
1e	Mr Dam's lychee hill	3	1.62-1.76	34.0-37.0
2	Lycheegarden resort in the park center	1	1.85-2.08	53.0-59.7
3	Hoi lake area	2	1.41-1.79	15.0-19.0
4a	Grassland	3	1.05-1.20	21.0-24.0
4b	TrungTrang cave	1	1.04-1.24	20.7-24.7
5	Ba Cat Bang island	1	5.14-5.63	29.0-31.7
6	Thap Nghieng beach	1	8.17-10.17	25.0-31.0
7	Trong Boi lake area	2	5.32-6.82	11.0-14.0
8a	Tai Keo	1	14.16-16.26	27.2-31.2
8b	Mr Trong lagoon	1	13.56-16.29	15.0-18.0
9	Van Boi beach area	1	6.41-7.16	22.7-25.3
10	Nam Cat beach	1	19.11-19.98	44.3-46.3
11	Cat Dua 1	1	16.5-18.4	120-133.3
12	Cat Dua 2	1	6.45-7.12	39.7-43.7
13	SaVat	3	2.81-3.31	25.0-29.0
14	Khoan Tien Duc- Me Go	3	2.2-2.60	11.0-13.0
15	Viet Hai village	1	0.87-1.00	26.0-30.0
16	Ang Noi	3	4.3-4.90	22.0-25.0
17	Ngan island	3	7.33-8.00	22.5-24.5
18	ManSim	3	7.58-8.25	23.0-25.0
19	Dau Be island	3	0.97-1.03	34.0-36.0
20	Dong Cong island, mangroves	2	1.02-1.12	27.5-29.5
21	Cai Minh Tu gate	3	0.77-0.82	28.5-30.0
22	Ang Vong	3	1.75-1.95	17.5-19.5

We have continued application of the price unit and amount of money suitable with methods that have been presented to build practical conditions in Cat Ba National Park. Table 3. In Table 3, the environmental lease

Table 3. Environmental lease price unit and amount of money that propose people's committee of Hai Phong city approves

Locations	Environmental lease price unit (million VND/ha/year)		Environmental lease amount of money at locations (million VND/year)
	Sea surface	Land	
1a	0.2	3.12	12.5
1b		2.50	30.0
1c		2.60	26.0
1d		2.23	17.8
1e		1.62	34.0
2		2.08	59.7
3		1.79	19.0
4a		1.05	21.0
4b		1.24	24.7
5	0.5	5.63	31.7
6	0.2	10.17	31.0
7	0.2	6.07	12.5
8a	0.5	16.26	31.2
8b	0.2	16.29	18.0
9	0.5	7.16	25.3
10	0.5	19.98	46.3
11	0.5	18.4	133.3
12	0.5	7.12	43.7
13	0.5	2.81	25.0
14		2.20	11.0
15		1.00	30.0
16	0.2	4.3	22.0
17	0.5	7.33	22.5
18	0.5	7.58	23.0
19	0.5	0.97	34.0
20	0.2	1.07	28.5
21	0.2	0.77	28.5
22		1.75	17.5

Thus, land lease price unit in locations ranges from 1.0 (Location No. 15 - Viet Hai Village) to 19.98 million VND/ha/year (Location No.10- Nam Cat beach). Sea surface belongs the area of 22 locations has lease price

unit fluctuates as follows: from 0.2 to 0.5 million VND/ha year⁻¹. This price unit is considered the starting price (floor price). The floor price adjustment will be carried out for a period of 3 - 5 years.

Comparison results between the amount of money for allocation and the amount of money for environmental lease in 10 locations listed in Table 4.

The total amount of environmental lease to develop ecotourism in 22 locations is 859.7 million VND/year. Compared to 2013, from 2014 onwards (excluding the increasing price factor) the total amount of forest environmental lease in Cat Ba National Park increases 648.5 million VND/year (greater than 3.31 times).

The analytical results of business activities of Nam Cat island travel company in 2013 showed total revenue was 3.2 billion VND, total cost was 2.85 billion VND (including spent 35 million VND to pay for allocated location), profit was 350 million VND. If under the previous regulations, this company must pay for environmental lease by 2% of revenue, the rent will be 64 million VND. As

results in Table 4, the amount of money that the company needed to pay for environmental lease will be 46.3 million VND/year, higher than 11.3 million VND compared with allocated price and is equivalent to 1.47% of revenue in 2013.

The analytical result of business activities of Cat Dua 1 island travel company in 2013 showed more positive situation, total revenue reached 9.6 billion VND, total cost was 6.7 billion VND (including spent 90 million VND to pay for allocated location), profit was 2.9 billion VND. Similar to the above case, this company must pay for environmental lease up to 192 million VND (2% of revenue). As shown in Table 4, the amount of money that the company needed to pay for environmental lease will be 133.3 million VND, higher than 43.3 million VND compared with allocated price and is equivalent to 1.39% of revenue in 2013.

Table 4. Comparison between the amount of money for allocation and the amount of money for environmental lease in 10 locations

Locations	Amount of money for allocation (million VND/year) (1)	Amount of money for environmental lease (million VND/year) (2)	Comparison (2): (1)
1a	20.0	26.0	1.3
1b	11.5	17.8	1.5
2	35.0	59.7	1.7
3	10.0	24.7	2.5
4	25.0	31.7	1.3
5	25.0	49.2	2.0
6	20.0	25.3	1.3
7	35.0	46.3	1.3
8	90.0	133.3	1.5
9	35.0	43.7	1.2

Thus, the price unit and the amount of money for environmental lease that is defined in the paper basically have high conformity with the real situation.

The paper also stipulates the calculate unit for environmental lease is location. Each

location is an integrated unit for leasing environment. Amount of money for lease is the amount of money that calculated for whole location. The determination of price unit (VND/ha/year) is only a inter mediately technical calculations step.

Timing of payments is every year, i.e. annually business must pay all the rent in this year. Stable time to apply price unit for environmental lease shall comply with the provisions of Article 8, 9 - Decree No. 142/2005/ND-CP and Clause 6, 7- Article 2 - Decree No. 121/2010/ND-CP on December 30, 2010 of the Government.

3.3. Classification of environmental lease locations by amount of money for lease

Table 5. Classification of environmental lease locations by amount of money for lease

Group	Criteria (million VND/year)	The number of locations	Notation of locations
I	≥ 60	1	1
II	30 - 60	10	1b, 15, 6, 8a, 5, 1e, 19, 12, 10, 2
III	20 - 30	10	4a, 16, 17, 18, 4b, 13, 9, 1c, 20, 21
IV	<20	7	14, 1a, 7, 22, 1d, 8b, 3

As such, environmental lease locations for ecotourism activities divided into four small groups: I, II, III, IV; the amount of money to lease must pay in a year are: Group I is ≥ 60 million VND/year, Group II is from 30 to 60 million VND/year, Group III is from 20- 30 million VND/year, Group IV is <20 million VND/year.

Environmental lease must closely link with environmental protection, forest- marine ecosystems and biodiversity conservation. This is not only a important solution but also anrequirementofecotourism.

Some solutions should be implemented as follows:

- Unit for environmental lease is location. Each location is an integrated unit for leasing environment. Amount of money for lease is the amount of money that calculated for whole location. Each location should not be determined as many parts (easy to calculate).

- Price unit in the study is considered the starting price (floor price). The floor price

As mentioned, each location isa calculate unit for lease, so locations clustering according to the amount of money for lease ascertain significance (Table 5). For the convenience of clustering, had separated afew key locations (1, 4, 8) in to the sub-location. Location 1 divided into 5 sub-locations: 1a, 1b, 1c, 1d, 1e; Location 4 divided into 2 sub-locations: 4a, 4b; Location 8 divided into 2 sub-locations: 8a, 8b.

adjustment will be carried out for a period of 3-5 years. In practice, it is necessary to use methods of procurement, in which price for environmental lease greater than or equal to floor price.

- Need to control price for environmental lease if there is a large variation in the socio-economic situation (as market price, consuming price index, inflation...).

- Need to guide visitors comply strictly with the provisions of the National Park and local communities, contributing to the protection of natural values and culture of the region.

- Protecting and promoting national identity, maintaining typical ecosystems and rare species.

- Creating more jobs and attracting local community to join in ecotourism services activities, such as participating in guiding tours, providing commodities, souvenir, developing shops to serve ecotourism.

- Encouraging businesses to contribute on raising the quality of life and improving living

environment for the local community, such as building infrastructure, support professional development, planting and caring forests.

If environmental lease in Cat Ba National Park is performed, this will be an important prerequisite to contribute for good implement perspective about socialization of ecotourism services and linking conservation with development, creating stable jobs and income for local people, raising awareness for visitors and the community, helping natural resources conservation, protect environment better, increasing revenues for the park, contributing to development of tourism services in Cat Ba island and Hai Phong city.

IV. CONCLUSIONS

- This study focused on 7 parameters, namely Land area of each location (size of the lease area); Attraction level to tourists; Service diversification level; Convenience level, conditions for reducing transport costs; Connection level with other tourism places and Level of investment attraction for businesses and private -reflect the characteristics, potential, and advantages of the lease area and 1 parameter reflects the "willingness to pay" level for environmental lease to develop ecotourism (preferential level about pricing in environmental lease). From this, the study inferred the 8th factor- is a general indicator reflecting the competitive advantages of each location. They are basis to give method for determining price for environmental lease and amount of money for payment that is built entirely in accordance with the provisions of the current documents, based on the results of practical investigation, assessment and in conformity with conditions to develop tourism in the market economy platform today. Besides, this study discussed about current status (location, area) of environmental lease locations and orientations

for ecotourism activities.

- The new finding in this study is using "fuzzy" number and "fuzzy regression" method that calculates environmental lease price unit and amount of money at 22 places in Cat Ba National Park also predicts the price of environmental lease for any place in the study area.

- With results have achieved, the study has some important implications as following:

+ About theory: provide more data, information that contribute to supply some important data relating to environmental lease.

+ About practice: propose price bracket for environmental lease, solve exist shortcomings, promote competitive advantages in environmental lease locations. At the same time, create opportunity to Cat Ba National Park links with local businesses and private, contribute to socialization of ecotourism. This study also promotes the link between the lessee and the lessor, solves exist difficulties about capital sources, services, building infrastructure to serve sustainable ecotourism development in Cat Ba National Park.

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DỊCH VỤ THUÊ MÔI TRƯỜNG CHO HOẠT ĐỘNG DU LỊCH SINH THÁI TẠI VƯỜN QUỐC GIA CÁT BÀ, VIỆT NAM

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²*Trường Đại học Lâm nghiệp*

TÓM TẮT

Nghiên cứu đã hướng vào giải quyết một vấn đề có tầm quan trọng lớn là thuê môi trường để thực hiện các hoạt động du lịch sinh thái. Nghiên cứu đã trả lời các câu hỏi: (i) lợi thế cạnh tranh của các địa điểm cho thuê môi trường như thế nào? (ii) - giá cho thuê môi trường để thực hiện các hoạt động du lịch sinh thái là bao nhiêu? và (iii) các địa điểm cho thuê môi trường có thể được xếp thành những nhóm nào? Hai phương pháp chủ đạo đã được áp dụng để trả lời những câu hỏi nêu trên là: phương pháp sẵn sàng chi trả (willingness to pay - WTP) và phương pháp hồi quy mờ (fuzzy regression - FR). Kết quả nghiên cứu trên 22 địa điểm cho thuê môi trường tại Vườn quốc gia Cát Bà, thành phố Hải Phòng, Việt Nam với nguồn số liệu năm 2014 cho thấy, tổng diện tích cho thuê là 413,5 ha, trong đó có 250,5 ha rừng, 15,4 ha đất lâm nghiệp không có rừng, 38,7 ha cây ăn quả, 5,0 ha đất cát và 103,9 ha đất mặt nước. Các lợi thế cạnh tranh của các địa điểm cho thuê môi trường được mô tả thông qua 8 thông số. Đơn giá cho thuê biến động từ 0,77 đến 19,98 triệu đồng Việt Nam trên hecta trên năm. Giá cho thuê môi trường cao hơn giá giao khoán hiện hành từ 1,3 đến 2,5 lần. Căn cứ vào giá cho thuê môi trường, các địa điểm cho thuê đã được chia thành 4 nhóm. Với những kết quả đã đạt được, nghiên cứu góp phần gợi ý suy cho việc nâng cao giá trị sử dụng đất và hiệu quả bảo vệ môi trường cho Vườn quốc gia Cát Bà ở Việt Nam.

Từ khóa: Du lịch sinh thái, giá thuê môi trường, mô hình hồi quy mờ, số mờ, thuê môi trường, Vườn quốc gia Cát Bà.

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