KEY FACTORS INFLUENCING THE PARTICIPATION OF LOCAL HOUSEHOLDS IN REDD$^+$ PROGRAM: A CASE STUDY IN VIETNAM

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SUMMARY

Nowadays, climate change is serious problem in worldwide. Deforestation of tropical forests contributes approximately 10 - 20% of global greenhouse gas emissions. In order to build the capacity of developing countries to encounter the challenges of reducing emissions from deforestation in developing countries (REDD), we need find key factors influencing the participation of local household in REDD+ program. From 2009 to 2012, the Japan International Cooperation Agency combined with Vietnam Administration of Forestry to develop REDD+ program in Dien Bien province. We conducted a survey of 150 households in Muong Phang commune, Dien Bien district, Dien Bien province. Results of the study show that six main factors, including: forestland area, ethnicity, concerned about forest degradation, household wealth ranking, rationality of government payment, and number of labourers, significantly influence participation of local households to REDD+ program in the study area. The study also indicates some potential solutions to increase the number of people participating REDD+ program.

Keywords: Binary logistic regression analysis, ethnic communities, factors affecting participation, UN-REDD+ Programme.

1. INTRODUCTION

Climate change is considerable problem that the world is facing today. It influences directly to forests and livelihood of local people who living depend on forests. Numerous studies have shown that deforestation and forest degradation result in the emission of about 17.3% of greenhouse gases in all economic sectors (IPPC, 2007). REDD (reducing emissions from deforestation and forest degradation) incentivises a break from historic trends of increasing deforestation rates and greenhouse gases emissions. It is a framework through which developing countries are rewarded financially for any emissions reductions achieved associated with a decrease in the conversion of forests to alternate land uses (Parker et al, 2009). REDD+ strategies go beyond deforestation and forest degradation, it includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in reducing emissions.

Implementation of the REDD+ program will have significantly environmental and socio-economic benefits, especially for mountainous rural areas. Local people cannot leave away from forests. It is concerned by scientists to find the viable solutions to ensure the life of people who living near forests. The factors that affect the participation and non-participation of people in REDD+ program are questions posed to forest managers. Thus, REDD+ program is implemented in many developing countries including Vietnam. That is machinery planned to offer finance rewards for ensuring forests are going to provide stable benefits.

Recognizing that "responding to climate change is vital," the Government of Vietnam issued Decision 799/QD-TTg (June 27, 2012) approving the National Action Program on REDD+ (Nguyen Tan Dung, 2012). It specifies that Vietnam will endeavor to limit deforestation and forest degradation, sustainable management of forest resources to reduce greenhouse gas emissions and improve forest carbon stocks, and conserve biodiversity along with eradicating hunger and poverty reduction and sustainable development. Decision 799/QD-TTG also allows Ministry of Agriculture & Rural Development (MARD) to select at least eight provinces with high greenhouse gas emission reduction potential and represent eco-regions participating in REDD+ pilot projects, in line with conditions, including Muong Phang commune, Dien Bien district, Dien Bien province. Once REDD+ programs are implemented, forest land will be

delivered to local people, especially ethnicities by the government. Owners of forests may be receive money for environmental benefits provided by the vegetation, and they can borrow the money from REDD+ program for their breeding instead of totally depending on forests. In addition, their management is necessary to implement the methods of restoring and increasing carbon stocks as well as providing a cheap but effective form to control forests. The participation of local people play an important role in the success of REDD+ program. Objective of this study is identify key factors that significantly influence decisions of local households to participate in REDD+ program in Muong Phang commune, Dien Bien district, Dien Bien province.

2. RESEARCH METHODOLOGY

2.1. Study area

Muong Phang Commune is located to the east-southeast of Dien Bien district with the natural area of 3,456 ha. The total forest area of Muong Phang commune is 1,369.6 ha, of which special-use forests and production forests account for 1,185.9 ha and 183.7 ha respectively. Up to now, Muong Phang commune has been conducting zone for regeneration with total area of 100.4 ha signed with forest protection and management board of Dien Bien province. Muong Phang commune has a tropical monsoon climate with two distinct seasons - the rainy and hot season lasts from April to October, and the dry season is from November to March of the following year.

Muong Phang commune has 1026 households with the total population of 4843 people. The commune includes 26 villages. The main ethnic composition includes Thai, H'Mong. Survey data conducted in April 2013 showed that the proportion of working age accounted for 57% of total population. In general, most of the households in the commune are living in a low economic condition. Households belonging to the middle income group account for 57.2% of the total number of households in the commune; similarly, households belonging to poor, near poor and better off household groups account 27.4%, 10.4% and 5% of the total number of households respectively.

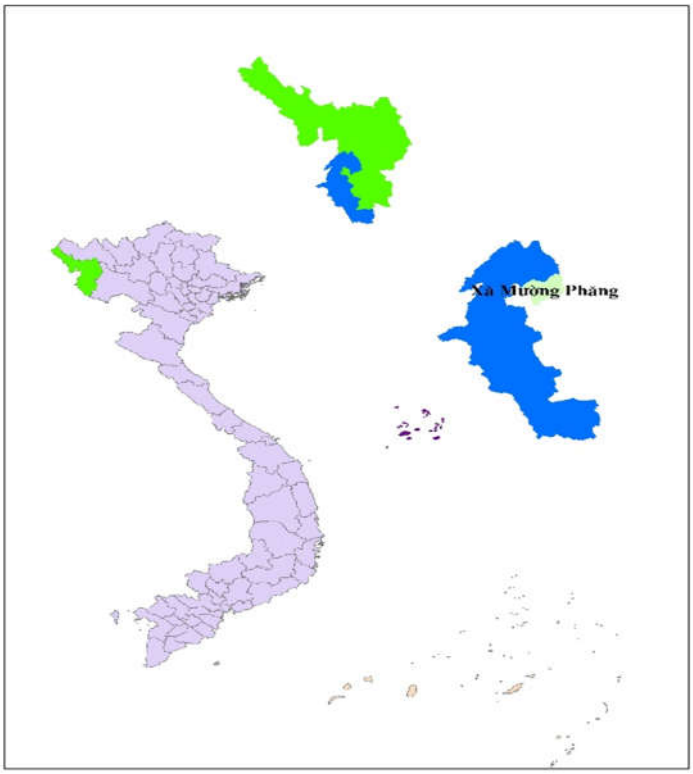

Figure 1. Muong Phang commune

(Source: People Committee of Muong Phang commune, 2017)

Infrastructure of Muong Phang commune has only met some basic requirements of life. The villages have asphalt roads, creating some convenience for connecting and transporting among villages. Almost of all households have been using electricity supplied by the national grid and a large number of households have access to water supplied by public water systems.

The products that local people collected from forests include firewood, timber and non-timber forest products (NTFPs) such as bamboo shoots, fruits, honey, medicinal plants and wild vegetables for serving local demand and selling them for tourists. This is also a good way to increase the income for local people.

2.2. Study methods

One hundred and fifty households were selected for survey according to the criteria in table 1. The attributes of the selected households are summarized in table 1. The survey was based on the conceptual model for assessing key factors affecting the decision of households participating in REDD$^+$ program (Figure 2). According to Lingani (2011), the factors influencing forest management programs are shaped by the structure of incentives for the members, which is affected by the context. The context, in turn, is defined as (1) the social network system (norms, values, and social capital), (2) members' socio-economic and demographic attributes (gender, age, level of education and income, etc.) and (3) the internal and external institutional context. REDD$^+$ is a program that provides an incentive for local people to manage forests sustainably. Therefore, this study follows the three groups of factors mentioned in figure 2.

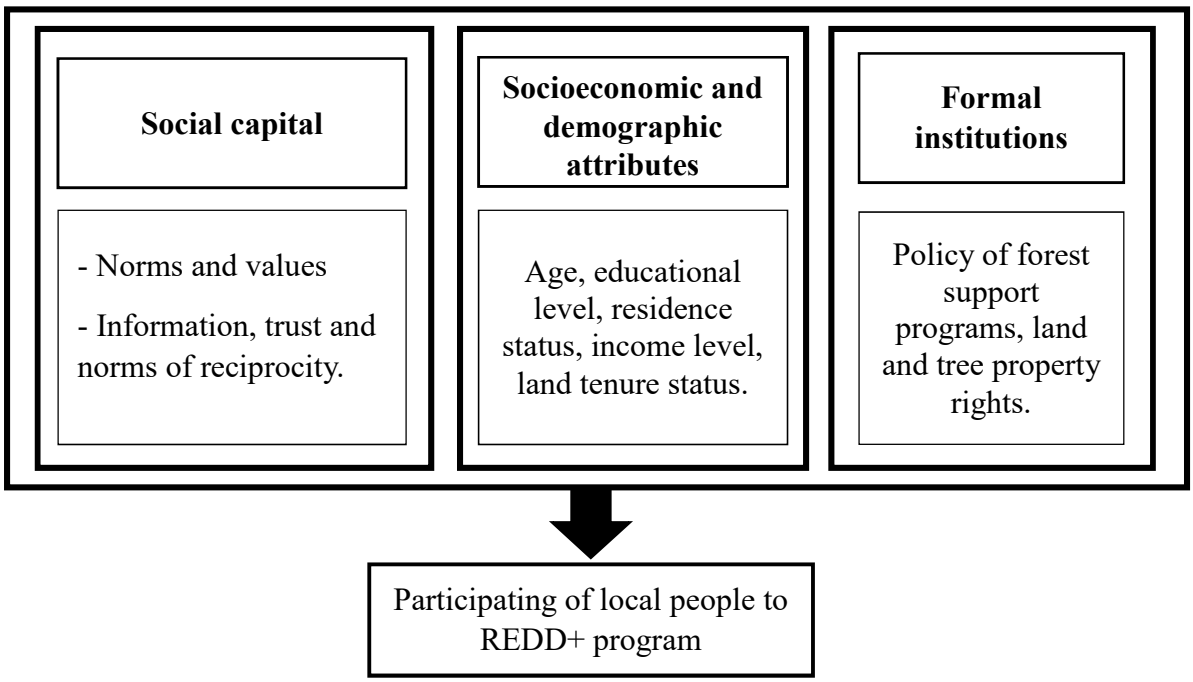

Figure 2. Factors influence to the participation to REDD+ program
(Source: Modified from Coulibaly et al. (2011), and Boissiere et al (2014))

The survey covered a questionnaire designed to collect data on general household characteristics, factors influencing the decision of household participating in REDD+ program. A copy of the questionnaire is available on request. Face-to-face survey was conducted in the research. This method allows researchers the opportunity to ask more questions, longer questions, more detailed questions, more open-ended questions, and more complex or technical questions. Moreover, face-to-face survey also offers advantages in terms of data quality (Manurung et al. 2008). The survey was conducted from 1st July 2016 to 30th August 2016.

Table 1. Survey sampling design in Muong Phang commune, Dien Bien district

		Household wealth ranking							
		Poor		Moderate		Rich		Total	
		Count	%	Count	%	Count	%	Count	%
Participation in REDD+ program	No	27	55.1	24	47.1	24	48.0	75	50.0
	Yes	22	44.9	27	52.9	26	52.0	75	50.0
	Total	49	100.0	51	100.0	50	100.0	150	100.0

A household survey was conducted in the representative commune (Muong Phang commune, Dien Bien district, Dien Bien province). Sample size of the study is calculated based on a formula provided by Tabachnick and Fidell (2007) that take into account the number of independent variables that we wish to use: N > 50 + 8 m (where m = number of independent variables). Because in our conceptual model (Table 2), we have 12 independent variables, we need 146 cases. In this study, we selected 150 households including 75 households having decision of tree participating and 75 households not participating to REDD+ program; therefore, the sample size is satisfied with requirements. Stratified random sampling was used to obtain representative households participating REDD$^+$ program and household wealth ranking. The 150 households were divided into 3 sub-group based on household wealth ranking including 49 rich households, 51 moderately well-off households and 50 poor households (Table 1).

IBM SPSS Statistics 23 was used for data analysis. Bivariate analysis was used to identify association between 'decision by households participating in REDD$^+$ program' (dependent variables) and factors (independent variables). Table 2 provides a full list of variables included in the analysis. Because the dependent variable in the stepwise binary logistic regression model is binary (0 or 1), the Student's t test was used to explore associations with continuous independent variables and the Pearson χ^2 test was used to explore associations with categorical independent variables. Independent variables found to be significantly associated with dependent variable in the bivariate analyses ($p < 0.05$) were considered as candidates in stepwise binary logistic regressions.

Binary logistic regression equation is presented as following:

$$Ln\left[\frac{P}{1-P}\right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_i X_i$$

where:

P: Probability of the household decides to participate in REDD+ program;

1 - P: Probability of the household decides not to participate in REDD+ program;

X_i: Independent variables or factors.

Before conducting stepwise binary logistic regressions, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity among the variables. Factors were entered into the stepwise binary logistic regressions if the significance of their relationship with dependent variable was $p < 0.05$ and removed from the stepwise regressions if the significance of their relationship with a dependent variable became $p \geq 0.10$. Factors were entered into the stepwise regressions in order of their correlation with an dependent variable, from most strongly (lowest P_{value}) to least strongly correlated (highest P_{value}) (Brace et al. 2006; Ho 2006).

Table 2. Description of variables

No	Variable	Description	States
1	Ethnicity	Ethnicity of households	1 = Thai ; 0 = H'Mong
2	Age	Age of household head	
3	Number of labours per household	Number of labours in a household	
4	Household ranking	The wealth ranking of each household	0 = Poor; 1 = Moderate; 2 = Rich.
5	Household forestland area	Forest land area of each household	
6	Concern about forest degradation.	The concern of local about forest degradation	0 = No; 1 = Yes
7	Education level of household head	The number of years households head were in school	
8	Occupation of household head	The occupation that gave to local people the main income.	1 = Farming; 2 = Off-farm
9	Rationality of government payment	The rationality of payment from the government	0 = No; 1 = Yes
10	Understanding about REDD+ policy	The understanding of local people about REDD+ policy. Some people who concern about forest degradation but they may not have any idea about REDD+ and its policy.	0 = No; 1 = Yes
11	Total land area of households	The number of total area of each household	
12	Forestland area of households	Forestland area is held by households	1 = '≤ 1 ha'; 2 = '> 1 ha'
12	Decision of households participating in REDD$^+$ program	Where households participate in REDD+ program	0 = No; 1 = Yes

3. RESULTS

Main Characteristics of Surveyed Households

The results from Chi square Tests in Table 3 show that ethnicity (H'Mong vs. Thai), forestland area (≤ 1 ha or > 1 ha), concerned about forest degradation (Yes or No), rationality of government payment (Yes or No), and understanding about REDD$^+$ policies (Yes or No) were significantly correlated with decision of households participating in REDD$^+$ program (Yes or No) at the 5% significance level. In contrast, household wealth ranking, educational level of household head, and occupation of household head were not significantly correlated with decision of households participating in REDD$^+$ program at the 5% significance level.

Table 3. Main characteristics of surveyed households for qualitative parameters

Parameter	Decision of households participating in REDD+				Total		Sig. (Chi-square Test)
	No		Yes				
	Count	%	Count	%	Count	%	
Ethnicity							
H'Mong	51	68.0	21	28.0	72	48.0	.000***
Thai	24	32.0	54	72.0	78	52.0	
Household wealth ranking							
Poor	27	36.0	22	29.3	49	32.7	.682^{NS}
Moderate	24	32.0	27	36.0	51	34.0	
Rich	24	32.0	26	34.7	50	33.3	
Forestland area							
≤ 1 ha	74	98.7	36	48.0	110	73.3	.000***
> 1 ha	1	1.3	39	52.0	40	26.7	
Concerned about forest degradation							
No	46	61.3	27	36.0	73	48.7	.002***
Yes	29	38.7	48	64.0	77	51.3	
Occupation of household head							
Farming	46	61.3	48	64.0	94	62.7	.736^{NS}
Off-farm	29	38.7	27	36.0	56	37.3	
Rationality of government payment							
No	44	58.7	28	37.3	72	48.0	.009***
Yes	31	41.3	47	62.7	78	52.0	
Understanding about REDD^{+} policies							
No	45	60.0	25	33.3	70	46.7	.000***
Yes	30	40.0	50	66.7	80	53.3	
Total	75	100.0	75	100.0	150	100.0	

*Note: *** p < 0.01, ** p < 0.05, *p < 0.10, NS Not significance (two-tailed tests)*

Results from Table 4 show that there were no significant difference at the 5% significance level for age of household head, number of labourers, total land area between households decided to participate and households decided not participate in REDD^{+} program.

Table 4. Main characteristics of surveyed households for quantitative parameters

Parameter	Decision of households participating in REDD+				Total		Sig. for t-test (2 tailed)
	No		Yes		Mean	Std. Dev.	
	Mean	Std. Dev.	Mean	Std. Dev.			
Age of household head	48.3	5.7	48.2	5.8	48.2	5.7	.932NS
Number of labourers	3.0	1.0	2.9	.9	3.0	.9	.665NS
Forestland area	.25	.17	1.22	.55	.74	.63	.000***
Total land area	3.22	1.45	3.30	1.48	3.26	1.46	.714NS
Education of HH head	.9	1.0	6.2	1.6	3.5	3.0	.000***

Parameter	Decision of households participating in REDD+				Total		Sig. for t-test (2 tailed)
	No		Yes		Mean	Std. Dev.	
	Mean	Std. Dev.	Mean	Std. Dev.			
Age of household head	48.3	5.7	48.2	5.8	48.2	5.7	.932NS
Number of labourers	3.0	1.0	2.9	.9	3.0	.9	.665NS
Forestland area	.25	.17	1.22	.55	.74	.63	.000***
Total land area	3.22	1.45	3.30	1.48	3.26	1.46	.714NS
Education of HH head	.9	1.0	6.2	1.6	3.5	3.0	.000***

*Note: *** p < 0.01, ** p < 0.05, *p < 0.10, NS Not significance (two-tailed tests)*

Key Factors Influencing Decision of Surveyed Households Participating in REDD+

Table 5. Model summary for key factors affecting decision of participating in the REDD+ program of surveyed households

Independent variable	B	S.E.	Exp(B)	Exp(B) adjusted	Sig. (P-value)	Influential order of factor
Constant	-9.46***	1.838	0.00	-	.000	
Ethnicity (H'Mong vs Thai)	1.60**	.492	4.98	4.98	.001	2
Number of labourers	.625**	.293	1.87	1.87	.033	6
Household wealth ranking	-1.14**	.367	.32	3.13	.002	4
Concerned about forest degradation (Yes vs No)	1.27**	.528	3.56	3.56	.016	3
Rationality of government payment (Yes vs No)	.91*	.484	2.48	2.48	.060	5
Forestland area (≤ 1 ha vs > 1 ha)	5.63***	1.160	277.55	277.55	.000	1
Dependent variable: REDD+ participation decision by households (1 = Yes; 0 = No)						
Number of observations	150					
Omnibus tests of model coefficients:						
• Chi-square	95.80					
• df.	6					
• Sig.	0.000***					
Model Summary:						
• -2 log likelihood	112.144***					
• Cox & Snell R square	0.472					
• Nagelkerke R square	0.629					
• Predicted percentage correct (%)	80.0					

*Note: *** p < 0.01, ** p < 0.05, *p < 0.10 (two-tailed tests);*
Influential order of factor with 1: highest; 6 smallest;
If B > 0 then $Exp(B)_{adjusted}$ = Exp(B); and if B < 0, then $Exp(B)_{adjusted}$ = 1/Exp(B).

Direct stepwise binary logistic regression was performed to assess the impact of a number of factors on the likelihood that households would report that they had made a decision of participating in the REDD+ program. The model contained six independent

variables (ethnicity, number of labourers, concerned about forest degradation, forestland area, rationality of government payment, and household wealth ranking). The full model containing all predictors was statistically significant, $\chi 2$ (5, N = 150) = 95.8, p < .001, indicating that the model was able to distinguish between respondents who decided and did not decide to participate in REDD$^+$ program. The model as a whole explained between 47.2% (Cox and Snell R squared) and 62.9% (Nagelkerke R squared) of the variance in the decision of participation in REDD+ program in the study area, and correctly classified 80.0% of cases.

As shown in table 5, six independent variables (forestland area (≤ 1 ha vs. > 1 ha), ethnicity (H'Mong vs. Thai), concerned about forest degradation, household wealth ranking, rationality of government payment, and number of labourers) were statistically significant in distinguishing between households decide or did not decide to participate in REDD+ program. The odds of households decide or did not decide to participate in REDD+ program were improved by 277.55 times if forest land area of household greater than 1 ha, by 4.98 times if household belongs to Thai minority ethnic group, by 3.56 times if household has concern about forest degradation, by 3.13 times if wealth ranking of household decreases one level, by 2.48 times if household has rationality of government payment, and by 1.87 times if number of labourers in household increase one more labourer (Table 5).

4. DISCUSSION

Forestland area

It does not come as a surprise from our study results that the forest land area of households is a factor affecting the decision of villagers in participating in the REDD+. The positive relationship between forest land area and decision to participate in REDD+ means that villagers are more likely to participate if their forestland increased. Some households who have just less than or equal 1 ha of forest land were not inclined to participate, because planting forest trees spent at least 5 - 6 years for harvesting while doing agricultural activities would have more profits. So they decided to use their land for agriculture instead of planting forest trees. On the other hand, Larson (2011) and Sunderlin *et al.* (2014) revealed that without secure tenure rights, local communities are vulnerable to dispossession – which could be a major concern if REDD$^+$ increases land values and outside interest.

Ethnicity

Thai and H'Mong are two main ethnic minority groups living in Muong Phang commune, Dien Bien district, Dien Bien province contribute strongly to the REDD$^+$ program. Forests are in the heart of their lives and the culture of ethnic minorities. It reflects the culture, customs and traditional values carried from generation to generation and the loss of forests will be detrimental to the community members' spiritual lives and traditional customs (Cromberg et al. 2014; RECOFTC, 2010; Tauli-Corpuz, 2010). Therefore, they are the major stakeholders in places that implement the REDD$^+$ program in Vietnam.

Concerned about Forest Degradation

Local people are strongly concerned about forest degradation. It is interesting to note that the villagers' awareness of REDD+ program significantly affects the decision to participate in the program. The more concerned about forest degradation the more local household participating in REDD$^+$ programs. Deforestation and forest degradation will negatively influence livelihood of people who live the study area and also will be main reasons of natural disasters such as flooding in rainy season, and drought in dry season. Local communities committed to participate in REDD$^+$ program, expecting REDD$^+$ program could help them to protect forests effectively (Nguyen and Rañola, 2017).

Rationality of Government Payment

Village leaders have a strong influence over participation of local people. They are the people who initially recognized the vital role of forests. Village leaders prompted their villagers to protect their land from hunters, leading to the fact that their forests have no change in compare with that in the past. Village leaders shared the payment of government equally, so most of people in their villages were in harmony with the government and together protected their forest (Grieg-Gran et al. 2014). However, inequality and not transparency of government payment are main reasons that reduce the participation of local villagers in REDD+ program.

Household wealth ranking

Results of the study indicated that poor and moderate households participating more compared with rich households. The main reason is that rich households they focus more on other off-farm activities while poor and moderate households depend more on farming and forestry activities.

Number of labourers

Results of the study indicated that the more labour there is in the household, the greater the probability that they will participate in REDD+ program. Because REDD+ requires participants to be involved in hard working activities such as measuring carbon sequestration, as well as checking and monitoring forest status regularly, only individuals of labour age can participate in forest protection and management.

5. CONCLUSIONS AND POLICY IMPLICATIONS

A wide range of biophysical, socio-economic, institutional and management factors influence the decision of households to participate in the $REDD^+$ program of Dien Bien district, Dien Bien province and these factors form a complex system of relationships. Based on statistical analysis it was found that forestland area (≤ 1 ha vs. > 1 ha), ethnicity (H'Mong vs. Thai), concerned about forest degradation, household wealth ranking, rationality of government payment, and number of labourers were among the most highly significant factors influencing the decision of household to participate in the $REDD^+$ program in the study area. Therefore, it is essential to focus on raising the awareness of each villager, and educating them about the importance of the land which they are managing in $REDD^+$ programs and forest management. Each ethnic minority group has a different cultural, understanding and educating people based on their cultural would maximize the effectiveness of the education actions in the $REDD^+$ program. In raising awareness of local people to promote action, they should be educated by realistic activities rather than through hearing the presentation from REDD+ trainers in order to increase their willingness to protect forest not only for their short-term benefits but also for their future lives.

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CÁC NHÂN TỐ ẢNH HƯỞNG ĐẾN SỰ THAM GIA CỦA CÁC HỘ GIA ĐÌNH ĐỊA PHƯƠNG VÀO CHƯƠNG TRÌNH REDD+: NGHIÊN CỨU ĐIỂM TẠI VIỆT NAM

Lê Đình Hải, Hoàng Thị Lan Phương

Trường Đại học Lâm nghiệp

TÓM TẮT

Hiện nay, biến đổi khí hậu là vấn đề nghiêm trọng mang tính toàn cầu. Sự mất rừng nhiệt đới đóng góp xấp xỉ 10 - 20% lượng phát thải khí nhà kính trên phạm vi toàn cầu. Để xây dựng năng lực cho các nước đang phát triển nhằm đáp ứng những thách thức của việc giảm phát thải từ mất rừng tại các nước đang phát triển, chúng ta cần phải xác định được các nhân tố chủ yếu ảnh hưởng đến sự tham gia của các hộ gia đình địa phương vào chương trình REDD+. Giai đoạn 2009 - 2012, cơ quan hợp tác quốc tế của Nhật Bản phối hợp với tổng cục Lâm nghiệp Việt Nam để xây dựng chương trình REDD+ tại tỉnh Điện Biên. Trong nghiên cứu này chúng tôi khảo sát 150 hộ gia đình tại xã Mường Phăng, huyện Điện Biên, tỉnh Điện Biên. Kết quả nghiên cứu đã chỉ ra rằng có 6 nhân tố chủ yếu ảnh hưởng đáng kể đến sự tham gia của các hộ gia đình vào chương trình REDD+ trên địa bàn nghiên cứu, bao gồm: Diện tích đất lâm nghiệp, thành phần dân tộc, quan tâm đến suy giảm tài nguyên rừng, phân loại hộ gia đình, sự hợp lý trong chi trả của chính phủ, và số lao động. Dựa trên cơ sở đó, nghiên cứu cũng đã đề xuất một số giải pháp nhằm tăng cường sự tham gia của người dân địa phương vào chương trình REDD+.

Từ khóa: Các nhân tố ảnh hưởng sự tham gia, Chương trình UN-REDD+, cộng đồng dân tộc, mô hình logit nhị phân.

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