Community-Based Payment for Forest Environmental Services: A Study in Vietnam

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Abstracts: The implementation of the Payment for Forest Environmental Services (PFES) strategy is increasingly being adopted through community-based initiatives globally. Nonetheless, the comprehension of such community-based PFES remains considerably limited. This investigation delves into the community-based PFES, scrutinizing the impact of local community involvement in PFES financial management mechanisms on the efficacy of this policy at the community level. Conducted in Dien Bien province, Vietnam, this study employed Participatory Rural Appraisal (PRA) techniques alongside household surveys. The findings indicate that the community-based PFES is operational with efficacy. It engenders motivation and fosters communal engagement in concerted forest conservation endeavors. Moreover, the pillars of self-administration, equitable distribution of benefits, and robust oversight are pivotal in determining the triumph of this policy approach.

Keywords: Forest Environmental Services, Payment for Forest Environmental Services (PFES), Community-Based FPES Implementation.

1. INTRODUCTION

In recent years, payment for forest environmental services (PFES) has known as a popular policy to provide economic incentives for forest protection. In many developing countries, including Vietnam, the implementation of the PFES policy is tending to take advantage of community institutions (or mechanisms) to promote the effectiveness of forest protection policy at the community level. Financial flows from the PFES encourage communities to participate in the policy implementation, thereby the mechanism of community forest management is expected to motivate people to protect the forest [12]. Supporters of this approach argue that community-based payment for forest environmental services may raise enforcement of policy and reduce transaction costs [13]. However, this mechanism is being also the topic of debate on issues related to the voluntary nature of PFES [19], as well as participation and motivation of community members in collective actions relating to environmental conservation. Does community-based payment for forest environmental services bring benefits to community members and enhance their participation in forest protection activities? When a community participates in PFES as a forest owner, whether the decision and the common benefit of the community are the sum of the benefits of each member, whether the poor can participate in and benefit from PFES, and whether PFES creates conflicts in the community when those who dominating community decisions receive benefits but not all community members, thereby may make harming the ability to achieve goals of forest protection [12].

Over the past decade, PFES has emerged as a mechanism that brings great expectation for forest protection to ensure the provision of forest environmental and ecological services [19]. Currently, there are two main approaches in the design and implementation of PFES-related programs and policies. First, PFES policy is often designed based on a market mechanism in order to create incentives for forest owners to provide environmental services from forests of households. In this approach, the government plays a role in creating a mechanism that helps environmental service users and service providers can transact with each other like market transactions [18]. The second approach is proposed base on the reality that creating a real market for forest environmental services is of utmost complexity. The government, therefore, designs PFES policy as a mechanism to mobilize financial resources to fund the goal of sustainable forest management. Under this approach, the government can apply a combination of market and non-market instruments to implement PFES policy [19]. With this second approach, PFES policy is formulated based on offsetting the costs incurred by forest owners in maintaining or improving forest environmental services [5].

In Vietnam, PFES is formulated following the second approach. This means that the government tries to account for the direct and indirect costs of forest protection activities of forest owners and mobilizes financial resources from users of forest environmental services. The goal of the policy focuses on creating a mechanism to mobilize sustainable financial resources to support the purpose of forest protection [17], as well as ensure livelihoods for indigenous people, who have livelihoods engaged in forest resource exploitation. As a consequence, the government has used both market and non-market instruments to promote transactions between providers and users of forest environmental services [13].

After more than 10 years of implementation, the PFES policy in Vietnam has brought positive results in forest protection. Various recent studies have summarized and evaluated the results and effects of the PFES policy on forest protection goals as well as ensuring livelihoods of people associated with forest resources [10]. These studies focus on the results of PFES implementation in Vietnam from 2010 to 2018. Some other studies also show the role of community in policy implementation. For example, the study of [15] in Son La reveals that PFES has a positive impact on forest protection and development. The percentage deducted from PFES income used for forest protection in each village is quite high (at least 40%). That money has motivated local people to protect forests. However, this study has not shown how community-based payment for forest environmental services work and what characteristics of community affect the effectiveness of the forest protection activities. The study of [13] on evaluating the results of PFES policy implementation in Vietnam also confirms that the PFES policy has created a stable financial source to support forest protection goals. On the other hand, this policy also plays an important role in improving the livelihoods of ethnic minorities and enhancing their participation in forest protection activities.

In recent years, community-based payment for forest environmental services has begun to receive more attention. Some countries have implemented this policy basing on their communities [9] [12]. Vietnam is also performing a community-based payment for forest environmental services policy in many localities, especially in the Northwest mountainous provinces [3]. There have also been some studies interested in the implementation of this policy at the community level and the role of the community in policy implementation [8] [1] [4].

In general, although many studies are mentioning community-based payment for forest environmental services, however, these studies have not shown the operating mechanism of the PFES policy at the community as well as the effectiveness of the PFES policy implementation this policy when basing on the community. Therefore, it is worth conducting a more in-depth study of the issues related to community-based PFES in order to clarify how it works in community settings. If this approach is effective, what factors determine the effectiveness of the policy?

This study aims to address answers for the mentioned above issues. It was carried out in Dien Bien province, Vietnam a mountainous province in the Northwest of Vietnam where forest owners consist of many ethnic minority communities who are living close to forest resources. Specifically, firstly, this study tries to find out how community-based payment for forest environmental services works at the community level. Secondly, it addresses the determinants of the success of the community-based payment policy for forest environmental services.

RESEARCH METHODOLOGY

The study was conducted in Dien Bien province. Primary data is collected from a combination of participatory rural appraisal (PRA) and household surveys through questionnaires.

- For the PRA method, the study applies in-depth interviews with relevant people such as: i) leaders/staffs of the Forest Protection and Development Fund of Dien Bien province, ii) leaders/staffs the district Forest Protection Department, iii) village leaders. These are people involved in the implementation of PFES policies in the research site from the provincial to the village level.

- For the household survey, the study uses a stratified random sampling method with a sample size of 233 households in two typical districts (Muong Ang and Muong Cha district of Dienbien province) with a confidence level of 95% and marginal error of 10%.

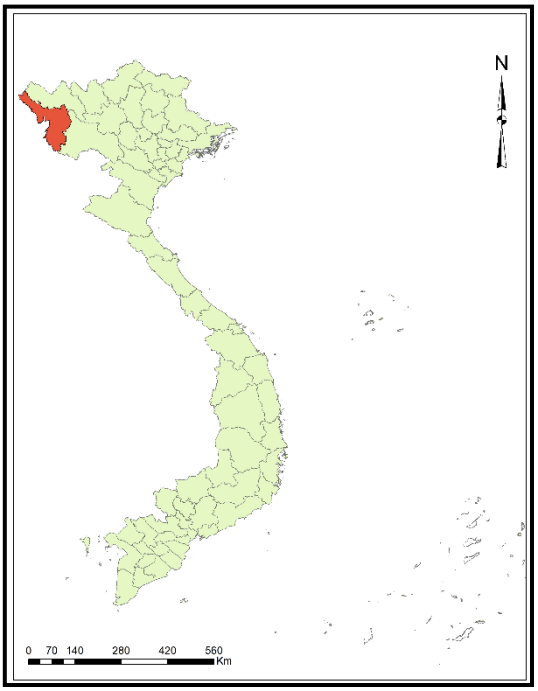

Figure 1. The research site of Dien Bien province, Vietnam
Source: www.bandovietnam.com.vn

For data analysis, both qualitative and quantitative methods are applied. Regarding the qualitative method, the information collected and aggregated from different people compared and triangulated in order to assess one problem from different perspectives. For the quantitative method, several statistical tools are utilised to describe the indicators of the community mechanism in forest protection management as well as the factors affecting the effectiveness of this mechanism on forest protection.

In this study, we rely on the Social-Ecological System Framework developed by [11] to build analytical variables and design data collection. This SES framework was proposed by [14] and widely applied in studies of resource management systems [2] [9]. The SES framework provides researchers with a portfolio of variables to examine resource system characteristics, household attributes, local governance systems, externalities, and interactions within the resource management system. Within the scope of this study, a number of variables are used for analyzing the operating mechanism of community-based PFES implementation and identify factors that affect the success of this mechanism in implementing PFES.

Table 1. Key study variables difined based on the SES framework

Variable set	Key variables
I. Resource systems	Natural characteristics of forest resources (RS1)
II. Resource unit	Management characteristics (RU5), Allocation of forest resources (RU7)
III. Resource Governance Systems	Property rights over forest resources (forestry land use rights – GS4) PFES mechanism: - Payment (GS7) - M&E system (GS5)
	Community self-governance capacity (GS6), including sub-variables:
	- Manage financial resources from PFES ✓ Distributing financial resources from PFES ✓ Manage and use money from PFES for collective forest protection activities ✓ Fairness and transparency in the distribution and use of money from PFES

	- Community forest protection regulations: ✓ Participation and consensus of members in the convention building process ✓ Mechanism of community-based PFES enforcement: Monitor and handle violations ✓ Effective enforcement of forest protection regulations
IV. Actors	Socio-economic characteristics of the residential community (A2: Ethnicity, Economic Conditions) People's awareness and attitudes about the value of forests and the meaning of forest protection (A7)
V.Interaction and Outcomes	People's participation in collective forest protection activities of the community (I7) Forest protection results (O1)

3. RESEARCH RESULTS AND DISCUSSIONS

3.1. Characteristics of forest resources and forest management in the research site

Forest resources in the study area are mainly regenerated natural forests and are mainly assigned to village communities to manage. Specifically, the natural forest area accounts for 407,030.3 ha the total area of Dien Bien and the proportion of forests assigned to the household and community for management is 304,439.4 ha (corresponding 74.8%). By origin, Dien Bien province's natural forest area accounts for the majority with 98.4%, the area of planted forests accounts for only 1.6% (**Table 2**).

Table 2. Statistics of forest area of Dien Bien province

No	Targets	*Area (ha)*	*%*
	Total area	407,030.3	100.0
1	*Classified by forest owners*	407.030.3	100.0
	Household/Community	304.439,4	74.8
	Other	102.590,9	25.2
2	*Sort by origin*	407.030.3	100.0
	Natural forests regenerate	400.482,6	98.4
	Planted forests	6.547,72	1.6

Source: Dien Bien Province Forest Protection and Development Fund, 2020

3.2. The Operating Mechanism Of Community-Based PFES

Regarding the allocation of financial resources from PFES payments, at the community level, money from PFES is allocated into two parts: One part for the community's forest protection fund (~20%) and the remaining part (~80%) is divided equally among households that are eligible for PFES payment. Research results also show that the amount of PFES payments allocated to households only contributes a very small part to the overall household income (less than 1% of the average household income).

Regarding the development, implementation and monitoring of the implementation of the Community-based PFES, the payments from PFES have motivated the village community to build and restore community conventions related to forest management. Although community forest management ever existed before, they were gradually eroded until funding from the PFES policy became available. Research results show that steady financial resources from FES have motivated the state management apparatus, especially the commune-level government apparatus, to pay more attention to restoring community-based forest management mechanism. With the active facilitation from local government, local people are involved in the process of building community forest management regulations.

The study also shows that community forest management is built in conjunction with the implementation of PFES policy. In fact, local people understand that to receive PFES payments from community forest protection funds, they must participate in the activities of the village's forest protection group to detect and prevent illegal practices, and at the same time participate in collective works or forest protection such as fight forest fires when mobilized by the community.

Regarding forest protection results, since the implementation of the PFES policy, people have actively participated in collective activities to protect forests, leading to better protection of forests. Survey results show that currently 98.3% of households participate in patrolling and forest protection activities in the village and the average number of days each household participates in these activities is 12.8 days/ year, and there is no difference between poor and non-poor households (Student t-Test is not statistically significant). Research results show that the PFES policy promotes people's participation in forest protection activities. That is, among the households participating in collective forest protection activities in the village, up to 75,2% started participating since 2013, the year people started receiving payments from the PFES policy (**Table 3**).

Table 3: Household participation in collective forest protection activities of the community

No	Time to start participating	Number (n = 229)	(%)
1	Before 2013	57	24,9
2	From 2013 onwards	172	75.2

Regardings effectiveness of community suppervision on participation in collective forest protection activities, up to 98.3% of interview participants agreed that community monitor household carrying out collective forest protection activities. Similarly, community monitoring machanism effectiveness also received 96.7% agreement (**Figure 2**).

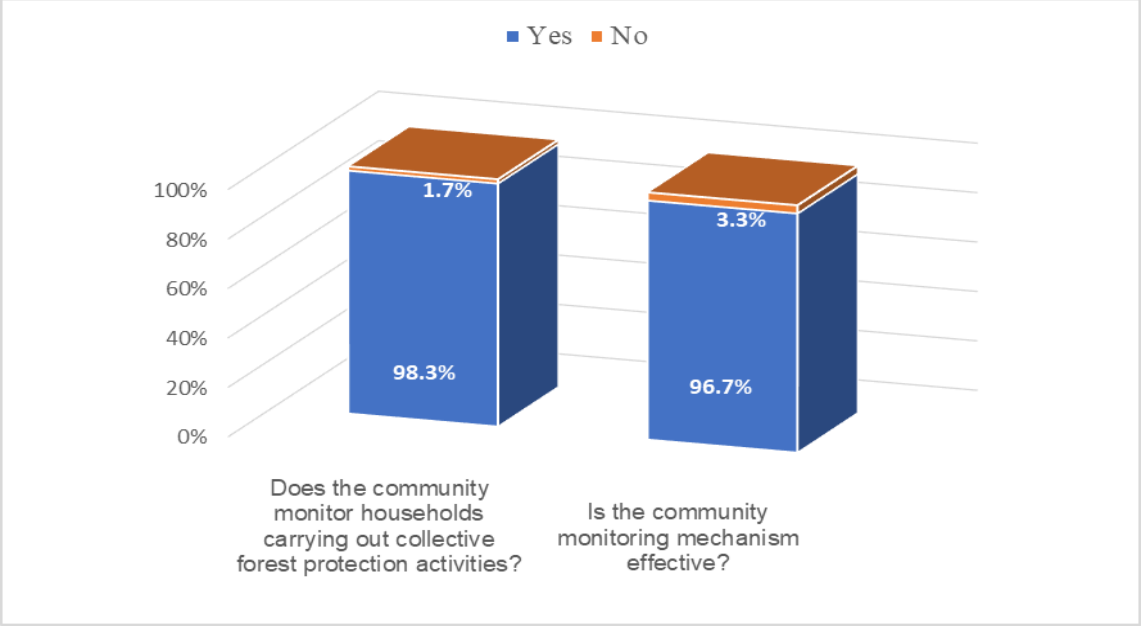

Figure 2: Effectiveness of community supervision on participation in collective forest protection activities

The change in people's awareness and behavior about forest protection has also contributed to preventing the risks of deforestation. Specifically, forest fires and people encroaching forests for farming have been better controlled since the PFES policy was introduced. In the study area, the phenomenon of forest fires has decreased significantly since the PFES policy was implemented, especially in the past 5 years, no forest fires have occurred. In addition, although land is an important resource for people's livelihoods, many households report a lack of land for agricultural production (39.1%), but most people do not encroach on forest land for agriculture

3.3. *Factors Contributing To The Success Of Community-Based PFES*

Results from this study show that the PFES policy has created a stable financial flow for the community and this has had a positive impact on the perception of leadership in the community and thereby changing people's awareness. PFES has brought about change throughout from commune leaders to village leaders and people. Since the PFES policy was implemented, many propaganda activities on forest protection and environmental protection have been enhanced in the area, increasing people's awareness of forest protection. The results of the household survey show that: Although over 37,0% of local households (mainly poor households) want to exploit forests (wood, firewood, other forest products) to serve their lives, the vast majority are aware of the importance of protecting forests as something they should do (98.7%), and the general perception is that forests bring many indirect benefits such as forests protecting land and water sources (93.1%), and 95.3% believe that forests need to be strictly protected and should not be exploited. In addition, people also have a supportive attitude towards the policy. In fact, 98.9% believe that participating in implementing the PFES policy is contributing to forest protection and development. They also believe that payment is a motivation to increase their responsibility to protect forests when 82,4% said they are committed to participating in forest protection, following policy requirements because they have received money from policy. In addition, the majority of people also understand the basic conditions to receive PFES money, which is that the forest must be protected in accordance with the PFES criteria.

The results also show that community self-management capacity is very important in the success of community-based PFES. The self-management capacity of the community is demonstrated through the ability to manage money from PFES payments and the capacity to ensure compliance with community forest management conventions.

Table 4: People's awareness and attitudes toward the benefits of forest exploitation and protection and PFES

1	Statement	Right		Neither right or wrong		Wrong	
		Quantity	Ratio (%)	Quantity	Ratio (%)	Quantity	Ratio (%)
11	Forests are an important source of income for local people, so people must be able to exploit firewood, timber, and forest products*	86	37.1	34	14.6	113	48.3
22	Forests need to be strictly protected and should not be exploited	223	95.5	8	3.4	3	1.1
33	Forest protection is very important because forests protect land and water sources	217	93.3	16	6.7	0	0.0
44	Most people think that participating in forest protection and development activities is a good thing to do	230	98.9	3	1.1	0	0.0
55	When participating in implementing the policy on payments for forest environmental services, I want to do what the policy requires	191	82.0	34	14.6	8	3.4
66	Participating in implementing the policy on payment for forest environmental services is contributing to forest protection and development	230	98.9	3	1.1	0	0.0
77	My family is committed to participating in forest protection and development because we receive payment	186	79.8	21	9.0	26	11.2
88	The results of inspection and acceptance ensure that forest cover is maintained	210	90.0	16	6.7	8	3.3

*Note: *There is a difference between the poor and non-poor households, the Chi-square test is statistically significant at the .05 level.*

Firstly, regarding the community's capacity to manage the forest protection fund (the main financial source of the fund is from PFES payments), the community allocates money according to agreed regulations with strict control by community. Specifically, the community complies with the regulations of the Forest Protection and Development Fund, which is that money from PFES payments can only be spent on forest protection activities and is not allowed

to be spent on other activities, even improve the livelihoods of people in the community. In addition, expenditures are recorded in detail and specifically and are supervised by community leaders and at least 3 other people of the community. Spending norms from the fund are also built by the community close to actual costs incurred. For example, the compasation for those participating in fighting forest fires is equal to the daily rate of local unskilled workers, thus creating motivation for local people participate in collective action of forest protection activities. In summary, the community's capacity to manage forest protection funds transparently and effectively has created a mechanism to mobilize people to actively participate in forest protection activities.

Regarding community management of direct payments to households, to receive PFES payments, people must be responsible for strictly complying with community forest management conventions. The regulations are very clear and specific, such as households must not encroach on forests, must not exploit forests illegally, and must participate in collective forest protection activities when mobilized. This finding indicates the advantages of community-based PFES. Because, if payment is paid directly to the household, the economic encentives households participating in forest protection is small. As mentioned earlier, average amount of money that a household received from PFES payments is less than 1% of its income. Moreover, this small amount of money does not create a boost in the household's economic development. In deed, households' money received from PFES is mainly used for living expenses (89.7%), very few households use the money production purposes (Table 5). Besides, a majority of local people (87.1%) also think that the amount of money received from PFES payments is low compared to their effort in forest protection actitivies. On the contrary, at the community level, the source of money from PFES is relatively large, and communities have high motivation to maintain this financial flow. Through community mechanisms, the community creates incentives for households to comply with forest protection practices.

Therefore, it can be argued that the reason why people agree and actively participate in protection is mainly because community-based PFES has created motivation for the community members in implementing the PFES policy. In addition, the self-management capacity of the community has created non-economic incentives that motivate people to participate in collective forest protection activities. This finding confirms the results of other studies in many countries around the world [12] [6] [7].

Table 5: Purpose of using money received from payments for forest environmental services

No	Purpose of using the money paid by households	Paid	
		Quantity	Ratio (%)
1	Living expenses	209	89.7
2	Spending for household appliances	49	21.0
3	Buying input materials for production (seeds/plants/seeds; animal feed/fertilizers, pesticides/veterinary drugs…)	58	24.9
4	Procurement and repair of machinery and equipment for production (barns, tools, machinery,…)	15	6.4

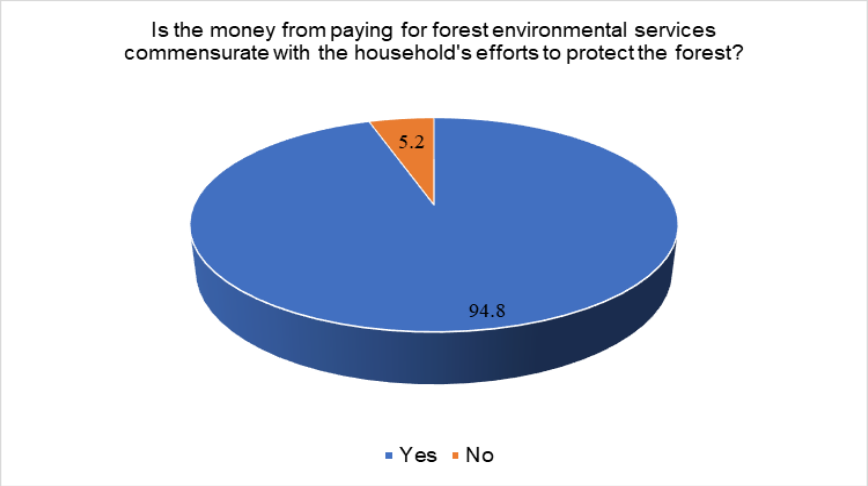

Figure 3: The proportionality of PFES payments to people's efforts to protect forests

Second, in addition to managing financial resources, the community's self-management capacity is also demonstrated in the construction and implementation of a monitoring mechanism to ensure the effectiveness of community forest protection regulations. The community has built a clear, fair and highly effective reward and punishment mechanism to motivate households to comply with the community's forest protection regulations. For example, for households that are notified and mobilized to fight the fire but do not participate, they will be fined 100,000 VND (if the incident occurs during the day) and 200,000 VND (if it happens at night)[1]. For illegal forest exploitation, there will be a fine of 3 times the value of the amount of exploitation and confiscation of the means used to exploit and transport forest products. The fine amount collected will be added to the forest protection fund and the fund will reward those who are instrumental in detecting cases and reporting violations.

What is worth mentioning here is that when there was no money from the PFES policy, the effectiveness of fines was not high because poor people did not have the money to pay. But since there is a PFES policy and the money is managed through the community, it has brought a steady cash flow, thus increasing the effectiveness of very high fines. If the violator does not have money to pay the fine, and they intentionally do not voluntarily pay the fine, the community will deduct it from the payment that the household will receive in the next period. The results of the household survey show that the effectiveness of the monitoring mechanism is very high. There are 97.4% responded that the community supervises people participating in collective forest protection activities and 94.8% said that community supervision is appropriate. The community monitoring mechanism really gives strength to the PFES policy, especially in the context that Vietnam's official monitoring system for PFES policy is lacking or not comprehensive low potency [16].

CONCLUSIONS AND POLICY RECOMMENDATIONS

The community-based PFES has proven to be a potent catalyst for engaging individuals in forest conservation efforts. Beyond the benefit of diminishing transactional expenditures, the community-based PFES model has fostered a robust impetus for communal proactive engagement in forest protection. This is attributed to the community-based payment structure, which ensures a consistent and ample financial reservoir for ongoing conservation activities. Furthermore, this approach has revitalized and enhanced the community-based forest governance system. With the financial support derived from the PFES policy, coupled with the community's autonomy over these funds, there has been a reconstruction and formulation of community forest management statutes, garnering widespread agreement among the local populace. This has been actualized through a vigorous and efficacious community surveillance mechanism.

[1] 100.000 VND is equivalent to 4 USD.

The study also suggest that under circumstances where the fiscal provisions of the policy are constrained and insufficient to engender economic motivations for individuals and households to engage in active forest conservation, the advancement of a community-based PFES mechanism is judicious. Moreover, the efficacy of this mechanism is contingent upon fortifying the community's self-managment capabilities, particularly in managing the financial assets derived from PFES. This ensures judicious and transparent allocation, alongside the establishment of explicit regulations governing community forest management at the community level.

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REFERENCES

[1] Brownson K., Guinessey E., Carranza M., Esquivel M., Hesselbach H., Ramirez L. M. & Villa L. J. E. S. (2019). Community-Based Payments for Ecosystem Services (CB-PES): Implications of community involvement for program outcomes. Ecosystem Services. 39: 100974.

[2] Colding J. & Barthel S. (2019). Exploring the social-ecological systems discourse 20 years later. Ecology and Society. 24(1).

[3] Do Thi Diep, Nguyen Minh Duc, Tran Nguyen Thanh & Le Thu Ha (2022). Implementation status of payment policy for forest environment services in Bac Yen district, Son La province. Journal of Economics and Development (published in Vietnamese). 305(2): 144-152.

[4[Duong N. T., De Groot W. T. & Economics (2020). The impact of payment for forest environmental services (PFES) on community-level forest management in Vietnam. Forest Policy. 113: 102135.

[5] Gómez-Baggethun E. & Muradian R. (2015). In markets we trust? Setting the boundaries of market-based instruments in ecosystem services governance. Ecological Economics.

[6] Hayes T., Grillos T., Bremer L. L., Murtinho F. & Shapiro E. (2019). Collective PES: More than the sum of individual incentives. Environmental Science & Policy. 102: 1-8.

[7] Kolinjivadi V., Charré S., Adamowski J. & Kosoy N. (2019). Economic experiments for collective action in the Kyrgyz Republic: lessons for payments for ecosystem services (PES). Ecological Economics. 156: 489-498.

[8] Laxmi Dutt B., Khadgi A., Rai R. K., Tamang B., Timalsina K. & Wahid S. (2018). Designing community-based payment scheme for ecosystem services: a case from Koshi Hills, Nepal. Environment, Development and Sustainability. 20(4): 1831-1848.

[9] Li T., Dong Y. & Liu Z. (2020). A review of social-ecological system resilience: Mechanism, assessment and management. Science of the Total Environment. 723: 138113.

[10] Mai Quyen & Le N. P. (2019). Evaluating Policy Implementation Result of Payment for Forest Environmental Services In Da Bac District of Hoa Binh Province Vietnam Journal of Agriculture Science. 17(12): 1023-1032.

[11] McGinnis M. D. & Ostrom E. (2014). Social-ecological system framework: initial changes and continuing challenges. Ecology & Society. 19(2).

[12] Murtinho F. & Hayes T. (2017). Communal Participation in Payment for Environmental Services (PES): Unpacking the Collective Decision to Enroll. Environmental management. 59(6): 939-955.

[13] Nguyen Minh Duc, Quyen Dinh Ha, Do Thi Diep, Do Thi Thanh Huyen & Nguyen Thi Thu Phuong (2020). Payment for forest environmental services in Vietnam: theories, practices, lessons learnt and policy implimentation in Vietnam. Economic Studies (in Vietnamese). 11(510): 13-25.

[14] Ostrom E. (2009). A general framework for analyzing sustainability of Social-Ecological Systems. science. 235: 419 - 422.

[15] Pham Thu Thuy, Dao Thi Linh Chi, Hoang Tuan Long, Nguyen Dinh Tien, Le Manh Thang, Nong Hong Hanh & Nga D. T. (2018). Impact of payments for forest environmental services (PFES) in Son La, Vietnam. Center for International Forestry Research (CIFOR). pages pages.

[16] Pham T. T., Wong G., Le D. N. & Brockhaus M. 2016. The distribution of payment for forest environmental services (PFES) in Vietnam: Research evidence to inform payment guidelines. Center fo International Forestry Research.

[17] To P. & Dressler W. (2019). Rethinking 'Success': The politics of payment for forest ecosystem services in Vietnam. Land Use Policy. 81: 582-593.

[18] Wunder S. (2015). Revisiting the concept of payments for environmental services. Ecological Economics. 117: 234-243.

[19] Wunder S., Brouwer R., Engel S., Ezzine-de-Blas D., Muradian R., Pascual U. & Pinto R. (2018). From principles to practice in paying for nature's services. Nature Sustainability. 1(3): 145-150.

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