Journal of Biodiversity & Endangered Species

Sengkhamyong, et al., J Biodivers Endanger Species 2018, 7:1
DOI: 10.4172/2332-2543.1000225

Review Article Open Access

A Study on Factors Influencing the Local People's Participation in Wildlife Protected Area Program: A Case Study from the Phouchomvoy Protected Area, Bolikhamxay Province

Xaysompheng Sengkhamyong[1], **Phouphet Kyophilavong**[1*], **Phetsamone Pommavong**[1], **Sengchanh Chanthasene**[1], **Thongpheth Chanthanivong**[1], **Sheena Phothisane**[1] **and Manysengphet Phakhounthong**[2]

[1]*Faculty of Economics and Business Management, National University of Laos, Lao Peoples Democratic Republic*

[2]*Faculty of Protected Area and Protection Forests, Bolikhamxay Agriculture and Forestry Office, Lao Peoples Democratic Republic*

***Corresponding author**: Kyophilavong P, Associate Professor, Faculty of Economics and Business Management, National University of Laos, Dongdok campus FEB, NUoL Saythani, Vientiane Capital 7322 Lao Peoples Democratic Republic, Tel: +8562055527321; E-mail: phouphetkyophilavong@gmail.com

Received date: Nov 05, 2018; **Accepted date**: Nov 15, 2018; **Published date**: Nov 25, 2018

Abstract

This study assesses the usefulness of the PhouChomVoy protected area by the local community to analyze the factors that influence individuals' participation in the payment for environmental service program. This study uses a statistical analysis and econometric approach with data on 244 individuals. The results from the econometric equation show that the relevant factors are age, gender, status as the head of household, and income.

Keywords: Factors; Local peoples' participation; Wildlife protection; Laos

Background and Problem Statement

Payment for Environmental Services (PES) is creative economic policy instrument to protect natural resources and environment, and PES has gain attention from policy maker and academics. Forest provides an ecosystem of fresh water, timber, habitat, carbon dioxide reduction, and biodiversity. However, human activities continue to shrink and destroy the forest. This problem has led to the Payment for Environmental Service (PES) program.

Lao PDR is rich in forestry resources; however, in recent year, it reduced and was destroyed.

1940 had a forest cover 70% (WB, 2005) and reduce to 40% in 2010 (UNDP, 2010). The estimated the forest was destroyed within two decades in the past about 91,200 ha (UNDP, 2010) or possibly up to 53,000 ha per year (WB, 2005). Forest quality decreased, with declines in the evergreen forest in 1992, 29% in 2005, at 8.2% (UNDP, 2010). Forest change includes a decrease in quantitative timber, changes in the composition of forest species and structures, loss of habitat and declining populations of wildlife and plant species in many areas. As aforementioned, the trend to the decline of forestry may lead on to adverse impacts on the economy, society, and the environment. The impact declines the number of wildlife, biodiversity and so on; it is likely to lead on to extinction.

The forestry resources degradation due to infrastructure development (hydropower, mining, roads), community growth, aspirations for economic improvement, and land conversion for agriculture. The over-exploitation of resources, including the unsustainable collection of None-Timber Forest Products (NTFP), hunting and fishing, and timber extraction. In addition, there are issues related with the limited development of participatory management and unclear benefit-sharing arrangements as an incentive for attracting a wide range of stakeholder participation in the management and funding support for National Protected Areas (NPAs). Lastly, the declining and fluctuating level of funding available to effectively manage the NPA system are also the main challenges [1-7].

Due to these issues, the National University of Laos and the Australian National University in cooperation with Ministry of Natural Resources and Environment, and Ministry of Agriculture and Forestry has implemented the Payment for Environmental Services (PES) schemes at PhouChomVoy protected area, Borlikhamxay province, Laos [1]. The forestry resources-biodiversity protection and poverty reduction are two main goals of this PES scheme [7]. This scheme provides funds for a household who voluntary participate as patrol teams. And this schemes also provide a fund for the village to develop the infrastructure. This PES scheme is the first pilot PES schemes in Laos. The main motivation and incentives of villagers who participate this schemes are not well understood due to lack of study on this issues.

Therefore, the objective of this paper is to investigate the factors that influence an individual's decision to participate in the PES program around the PhouChomVoy protected area. This study will examine the people living in six villages: Nahat, Nahrung, HangNa, Samteoy, Najalai, and ThongPae in the Khamkerd district of Borikhamxay province. The timeline for data collection is from March to the end of April 2017.

Payment of Environmental Service (PES) in PhouChomVoy Protected Area

The PhouChomVoy protected area is on the border of the Borlikhamxay province (Laos) and Ngean province (Vietnam). It is also a part of the Nakay-Nateun protected area and the Nammuan-Nanyuang protected area. Although it is a very important area, people can go and use the forest area that as a result has declined in abundance (as opposed to before). But if we compare it to other surrounding areas, there is forest coverage of up to 70-75 percent of the

area. All of this confirms that PhouChomVoy area is still abundant with many species of animals that the surrounding area is encroaching on. This area is important at the provincial level because of its special features of geography and its abundance of biodiversity [5].

The PhouChomVoy protected area is really important to the wildlife that is near extinction. This mountain's forest has decreased compared with its total in 2010. In particular, the highland evergreen forest was 73 percent and has decreased by 9 percent; the mixed forest was 18 percent and has decreased by 5 percent; the bamboo forest covered 7 percent and has decreased by 2 percent; and the wildlife is mostly wild pigs at 74 percent, deer at 2 percent, and monkeys at 2 percent. The wildlife decreased by 45 percent compared to survey data in 2010. Wildlife threats include animal traps and hunters at 17 percent, 14 percent, and 8 percent, respectively. A survey by the Wildlife Protected Area Community in 2015 found 59 cases of wildlife threats, 52 wildlife paths, and the tangible wildlife was mostly wild pigs. The problem of local hunters and those from neighboring countries over the years has decreased the wildlife populations (WCS, 2016). Currently, some groups of people are also involved in agro-forestry abuses, such as slash and burn, raising livestock, and hunting and harvesting of wild things into extinction in the east and south of the protected area [8-14].

In order to protect wildlife and forestry resources in PhouChomVoy protected area, the PES schemes have been implemented since May 2017. The detailed information of PES designs and implementation discussed.

Literature Review

There are a number of studies that are related to villagers' participation in forestry and wildlife protection programs in developing countries. The attitudes of local populations in the protected area of Western Serengati, Tanzania The results of the study show that the level of education, the status of the family, and the size of the household were important factors in the decision to participate in the protected area [2]. The possibility of participating in a forest protected area by using multiple regression. They interviewed 243 people living in protected area areas in Haiti. The results show that the age of the respondents to the questionnaire has a negative impact on people's participation. This impact means that older people do not participate in activities but participate in planning and benefiting from the protected area. The factors affecting attitudes of local people toward the Red-billed Quelea in the Kondua area of Tanzania [10]. The purpose of the study was to evaluate the concept of people living in suburban areas with the costs and benefits of a bird protected area. The number of respondents to the questionnaire was 360 people in 6 villages. The affective factors of gender and education level affected the decision to participate in the protected area. Identified the factors influence the participation in Costa Rica's Payments for Environmental Services (PSA) program. The finding shows that farm size, human capital and household economic factors, and information variables significantly influence participation in PSA program alternatives. The socioeconomic factors influencing the motivation to be engaged in the Mexican Payment for Environmental Services Programme used logit models. The finding shows that formal education, training, PES influence water management, and land boundary conflicts are crucial factors effect on the Payment for Environmental Services. The factors influence farmers to join Payments for Ecosystem Services (PES)-water schemes in Brazil. They found that the access to information and general environmental concern were found to be important variables to explain the propensity of farmers to participate in PES schemes. The participation under Paying for environmental services- common property in a peri-urban context in Mexico city. The authors found that institutional arrangements, human capacity and capability and perception of the natural resource context significantly influence recognized participation in PES programs in Mexico city [15-19].

From the literature review, it shows that there are various factors influence decision to join Paying for Environmental Services (PES) schemes. There is no study on the participation of PES schemes in the case of Laos. According to our best knowledge, it is the first study on investigates the factors that influence an individual's decision to participate in the PES program in the case of Laos.

Methodology

This research assesses forest usage with an econometric approach to investigate the factors that influence an individual's decision to participate in the PES program. The equation that is used for estimation is below:

$$P(ser = 1) = f(\beta_o + \beta_1 Age + \beta_2 Gender + \beta_3 Hm + \beta_4 Hs + \beta_5 Edu + \beta_6 Occ + \beta_7 Income + \varepsilon_i)$$

Where ser is a binary variable equal to one if an individual participates in the service and zero if the individual does not. Age and Gender are the age and gender of the individual. Age is the number of years and Gender equals one if the individual is male and zero if female. Hm indicates if the individual is the head of the household, and Hs is the size of the household. Edu is the years of schooling, and Occ is the occupation of the individual. Occ equals one if he or she is a rice farmer. Income is an annual income in Kip (Lao currency).

Because the dependent variable is a binary outcome, the least square estimation is not an efficient technique compared to other techniques such as the maximum likelihood. Thus, the equation above is estimated with the Logit model. The equation was applied to the survey responses of 244 individuals. They were randomly selected from each village. Of the respondents, 64 percent were heads of households. The respondents were 66 percent male. The average age of respondents was 36 years old. Lao and Hmong ethnicities had 29 and 28 percent shares of the sample. The other respondents were a combination of Phouthai, Mian, Theang, and Khmmu ethnicities.

The average household was about 5 persons. Ninety-six percent of the respondents were married. In addition, 68 percent of the respondents were soldiers. This is because military service is compulsory. The majority of respondents (54 percent) completed primary education. The second highest share (25 percent) completed lower secondary education, followed by upper secondary education (14 percent). The main economic activity of the respondents was as a rice farmer.

Empirical Results

In the sample, 33 percent of the respondents said that they use the forest as a source for cooking fuel. From the field survey, one household used about three cubic meters of timber per year. Further, 18 percent of the respondents answered that they used the forest as a source of food such as bamboo, mushrooms, vegetables, and fruits. Some respondents also suggested that the forest was a source for medicine. Of the respondents, 85 percent stated that they sometimes went to the forest, while only 2 percent mentioned that they went to the forest every day, and 14 percent said they had never been to the

forest. Among the respondents, 83 percent had never attended the forest protection program. This is because the previous service program did not recruit volunteers. The average annual income of the individual is 11.8 million Kip. The highest income is 57 million Kip and the lowest income is about 1 million Kip.

The estimation results are shown in Table 1. The table reports the marginal effect on the mean of the independent variables, standard error (S.E.), t-test, and the p-value. The pseudo R square is equal to 0.54 that indicates the independent variables explain 54 percent of the dependent variable.

	Marginal Effect	S.E.	t-test	p-value
Age	-0.01***	0	-7.51	0
Gender	0.46***	0.05	9.11	0
Hm	0.15***	0.05	3.25	0.001
Hs	0.02	0.01	1.1	0.272
Edu	0.01	0.01	1.07	0.286
Occ	-0.02	0.05	-0.43	0.666
ln (Income)	-0.14***	0.03	-4.7	0
Note: ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels respectively. Source: The authors' estimation				

Table 1: Estimation results.

The variable Age has a negative effect and is statistically significant at the 1 percent level. Its marginal effect is -0.01which shows that as the age increases by one year, the likelihood of participating in the service decreases by 1 percent. In other words, younger people are more likely to participate in the service. The result supports the finding in Dolisca.

The gender of respondents also plays an important factor. Its effect is 0.46 and is statistically significant at the 1 percent level. It shows that the male individual has a 46 percent higher propensity of participating in the service. An individual who is the head of the household has a higher chance of participating in the service. This is because the head has more authority to decide to join the service than another household member. Its marginal effect is 0.15 and is statistically significant at the 1 percent level. Unexpectedly, the household's size and the education of individuals have no effect on the decision to participate. The marginal effect of household size is 0.02 and that of the education level is 0.01. The positive sign means that bigger households and higher educated individuals have a higher possibility of participating in the service. The potential reason for Hs being statistically insignificant is that households with more members have a higher chance of its members working in a variety of jobs. But larger households also have a greater possibility of a member joining the program. When there are both positive and negative effects, the effect becomes statistically insignificant. Similarly, higher educated individuals understand the importance of protecting forests, but they have more opportunity to work in a variety of jobs with higher income. The variable Occ shows an expected negative result but is statistically insignificant. Because individuals already work as farmers, they are not willing to work for the program. However, farm work is not full time all year therefore some farmers are able to participate in the program. An individual with higher income has a lower probability of participating in the program. The marginal effect of the logarithm of income is -0.14 that is statistically significant at the 1 percent level. In other words, when income increases by 1 percent, the probability of participating in the program decrease approximately by 14 percent.

Conclusion

This research assesses the forest usage of local people in the PhouChomVoy protected area and investigates the factors that influence an individual's decision to participate in the PES program. There are 244 respondents to a survey that are randomly selected from the local area. The data are used to assess the forest usage with an econometric equation, Logit model.

The results show that the main benefits of forest usage to the local community are as a food source, cooking fuel, medicine, and other commodities. The results from the logit model show that the relevant factors in the decision to join the program are age, gender, head of the household status, and income. The factors that are statistically insignificant are household size, education, and occupation as a farmer.

This research has important policy implications. The result shows the benefit that the forest provides local people, thus the government should consider providing the necessary commodities in order to reduce the forest harvesting. Additionally, this study also identifies the factors that are important to encourage individuals to work for the forest protection program. The results will help the government to recruit participants more effectively.

References

1. Bennett J, Kyophilavong P, Schuefele G, Renton M, Tsechalicha X (2016) Designing and implementing Payments for Environmental Services schemes: Experience from Lao PDR , Effective Implementation of Payments for Environmental Services in Lao PDR, Canberra.
2. Dolisca F, Carter DR, McDaniel JM, Shannon DA, Jolly CM (2006) Factors influencing farmers' participation in forestry management programs: A case study from Haiti. Forest Ecology and Management 236: 324-331.
3. Engel S, Pagiola S, Wunder S (2008) Designing payments for environmental services in theory and practice: an overview of the issues. Ecol Econ 65: 663-674.
4. Figueroa F, Caro-Borrero A, Revollo-Fernandez D, Merino L, Almeida-Lenero L, et al. (2016) I like to conserve the forest, but I also like the cash.

Socioeconomic factors influencing the motivation to be engaged in the Mexican Payment for Environmental Services Programme. J Forest Econ 22: 36–51.

5. Hay E, Kragt M, Renton M, Vongkhamheng C (2017) Modelling the effects of anti-poaching patrols on wildlife diversity in the Phou Chomvoy Provincial Protected Area, Research Report 11, Effective Implementation of Payments for Environmental Services in Lao PDR.
6. Kideghesho J, Roskaft E, Kaltenborn BP (2006) Factors influencing protected area attitudes of local people in Western Serengati, Tanzania. Biodiversity and Conservation 16: 2213-2230.
7. Kyophilavong P, Tsechalicha X (2011) Sustainable financing mechanisms for national protected area management in lao PDR: Issues and options, Department of Forestry, Ministry of Agriculture and Forestry In collaboration with IUCN Lao PDR.
8. Neitzel KC, Caro-Borrero AP, Revollo-Fernandez D, Aguilar-Ibarra A, Ramos A, et al. (2014) Paying for environmental services: Determining recognized participation under common property in a peri-urban context. Forest Policy Econ 38: 46-55.
9. Norden A (2014) Payments Types and participation in payments for ecosystem services program. Central America: Research program in economics and environments for development.
10. Manyama F, Roskaft E (2014) Factors affecting attitudes of local people toward the red-billed Quelea (Quelea quelea) in Kondoa District, Tanzania. Int J Biodivers Conserv 6: 138-147.
11. Scheufele G, Vongkhamheng C, Kyophilavong P, Tsechalicha X, Bennett J (2016) Providing incentives for biodiversity protection: anti-poaching patrolling in the Phou Chomvoy Provincial Protected Area. Effective Implementation of Payments for Environmental Services in Lao PDR, Canberra.
12. Tsechalicha X (2016) Engaging communities in payments for environmental services scheme for the phou chomvoy provincial protected area. Effective Implementation of Payments for Environmental Services in Lao PDR, Canberra.
13. United Nations Development Programme (2010) Investment and sustainability of the forest sector, and environmental integration projects in poverty reduction activities in Lao PDR.
14. Vongkhamheng C (2015) Phouchomvoy provincial protected area: A biodiversity baseline assessment. Lao wildlife protected area association (Lao WCA).
15. Wildlife Protected Society (2006) Significant wildlife and wildlife habitats of bolikhamxay province. Wildlife Protected Society (WCS).
16. World Bank (2005) Lao PDR Environment Monitor World Bank Country Office and Science Technology and Environment Agency Vientiane Lao PDR.
17. Wunder S, Engel S, Pagiola S (2008) Taking stock: A comparative analysis of payments for environmental services programs in developed and developing countries. Ecol Econ 65: 834-852.
18. Zanella MA, Schleyer C, Speelman S (2014) Why do farmers join Payments for Ecosystem Services (PES) schemes. An Assessment of PES water scheme participation in Brazil. Ecol Econ 105: 166-176.
19. Zbinden S, Lee DR (2005) Paying for environmental services: An analysis of participation in Costa Rica's PSA program. World Development 33: 255-272.