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**Souphonphacdy, Daovinh**

Laboratory of Environmental Economics, Department of Agricultural and Resource Economics,  
Graduate School of Bioresource and Bioenvironmental Sciences, Faculty of Agricultural

**Yabe, Mitsuyasu**

Laboratory of Environmental Economics, Department of Agricultural and Resource Economics,  
Faculty of Agriculture, Kyushu University

**Sato, Goshi**

Laboratory of Environmental Economics, Department of Agricultural and Resource Economics,  
Faculty of Agriculture, Kyushu University

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## Impact of Rubber Concession on Rural Livelihood in Champasack Province, Lao PDR

Daovinh SOUPHONPHACDY<sup>1</sup>, Mitsuyasu YABE<sup>2</sup> and Goshi SATO<sup>3</sup>

Laboratory of Environmental Economics, Department of Agricultural and Resource Economics  
Graduate School of Bioresource and Bioenvironmental Sciences,  
Faculty of Agriculture Kyushu University, Fukuoka 812–8581  
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Investment in rubber involves considerable areas of land concession. Some state-owned concession areas that were formerly used by local people have been converted by the state for rubber production. Land concession affects the socioeconomic condition of the local community in terms of shortages of agricultural land, collection of non-timber forest products, limitations on the areas used for livestock, and biodiversity loss. The aims of this study were: to evaluate the level of job satisfaction in local community residents on their becoming laborers in a rubber company; to compare socioeconomic profit from major rubber- and non-rubber-related activities by focusing on rice production and rubber worker activities; and to estimate the factors that affect rubber worker income levels and rice farmer profits. The main methodology involved application of comparative analysis between the incomes of rubber workers and rice farmers, using socioeconomic characteristics to compare the two groups' respondents through descriptive analysis and an ordinary least squares regression model. The study was based on data collected through a survey of 158 farmers carried out in the Bachiang district, Champasack province, in the southern area of the Lao People's Democratic Republic in September 2010. Based on these findings, we can conclude that rice production is the traditional activity of farmers and is more beneficial to them than being a worker in rubber concession areas. Although rubber concession is being promoted by the government, these individuals are more satisfied with farming activity than being rubber workers.

**Key words:** Rubber concession, rice plantation, income improvement, OLS regression model

### INTRODUCTION

The Lao People's Democratic Republic (Lao PDR) is a small landlocked country located on the Indochinese peninsula, and is of the one of poorest countries (in terms of GDP) in the world. Since 1986, the government of Lao PDR has carried out an open-door policy known as "New Economic Mechanism", a strategy to make Lao PDR both an economically liberal and a socialist nation. The country has undergone rapid change in socioeconomic mechanisms, with the encouragement of foreign investment, industrialization, intensified agriculture, and integration with both the regional and global markets.

Lao PDR is one of the countries for which it is important to achieve the Millennium Development Goals set by the United Nations Development Programme (UNDP) to reduce poverty and ensure environmental sustainability by the year 2020. The government encourages both local and international sectors to invest in Lao PDR by permitting land concession to plant industrial

trees and agricultural cash crops. The government also guarantees investors' property rights by approving regulations and giving priority to their businesses, as in the 1986 law on promoting foreign investment (Assembly, 2004).

Increasing population and economic activities linked to the country's natural resources have impacted environmental quality and livelihood. In 1970, forest resources covered about 70% of the total land area; this declined to 42% by 2002. In response, the current strategy is to ensure the country's forest coverage at 65% by 2015. Fields for agricultural purposes are being rapidly converted to tree industrial plantations. For instance, the area devoted to rubber plantations increased from 140,655 ha in 2008 to 248,846 ha in 2010 (Agriculture and Forestry Office, 2009). While these investments are often promoted as inherently good for the country's long-term development, various studies and reports from projects on the ground have raised concerns about the implications that these projects are having on the natural environment, sustainability of local economies, food security, and livelihood stability.

Investment in rubber involves considerable areas of land concession. Some state-owned concession areas that were formerly used by local people have been converted by the state for rubber production. Land concession affects the socioeconomic condition of local communities because of shortages of agricultural land, non-timber forest products (NTFPs) collection, limitation on livestock area, and biodiversity loss. Moreover, jobs are not guaranteed, and workers often have disad-

<sup>1</sup> Laboratory of Environmental Economics, Department of Agricultural and Resource Economics, Graduate School of Bioresource and Bioenvironmental Sciences, Faculty of Agriculture. Email: vinh079@hotmail.com

<sup>2</sup> Laboratory of Environmental Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University, Fukuoka 812–8581

<sup>3</sup> Laboratory of Environmental Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University, Fukuoka 812–8581

vantages and unfair payment.

The aims of this study were: to evaluate the level of job satisfaction in local communities on their becoming laborers in a rubber company; to compare socioeconomic profit from major rubber- and non-rubber-related activities by focusing on rice production and rubber worker activities; and to estimate the factors that affect rubber worker income levels and rice farmer profits by focusing on age of respondents who work on those activities.

STUDY AREA AND METHODOLOGY

This study was based on data collected through a survey of 158 farmers carried out in the Baching district, Champasack province, in the southern area of Lao PDR in September 2010. Two villages were chosen in which farmers had lost land and had become workers for a rubber company.

A detailed interview structure was used to collect data on socioeconomic and demographic characteristics of the respondents on their farming practices, output, and profit during 2009–10. The survey questionnaire form was divided into three sections. The first section was designed to collect data on rubber workers and rice farmers. The second section was designed to collect data on agricultural land activities and rice production in 2009–10. The last section investigated demographic and socioeconomic characteristics of respondents who participated in this study.

The main methodology involved application of comparative analysis between income of rubber workers and rice farmers, using socioeconomic characteristics to compare the two groups of respondents by descriptive analysis. An ordinary least squares (OLS) regression model was used to investigate factors that affected profit of rice production and income of rubber workers.

RESULTS AND DISCUSSION

With regard to general changes in total household rice sufficiency over the previous 12 months, there were considerable differences noted between farmers and workers. 40.7% of farmers felt that their household rice sufficiency increased while for workers this figure was only 13.1% (Table 1). However, 39.0% of farmers

Table 1. Household Rice Sufficiency over the Last 12 Months

Measuring group	Rice farmers (59)		Rubber workers (99)	
	Frequency	Percentage	Frequency	Percentage
<i>Decreased</i>	23	38.98	70	70.71
<i>Stay the same</i>	12	20.34	16	16.16
<i>Increased</i>	24	40.68	13	13.13
Total	59	100	99	100

Source: field survey, 2010

reported that their rice sufficiency had decreased because some of their lands were lost to rubber concession and thus the agricultural land for rice production was reduced; at the same time, 70.7% of workers reported that their rice sufficiency had decreased because their working days in a rubber company were reduced from 12 months in 2007 to 10 months in 2010 (Table 1).

Nongboknoy and Nongkok villages, especially poorer households, traditionally depended on natural forests as major sources of food (fruits and vegetables) and cash income. We found in our interviews that the forests were a major and additional source of income for many people. Local people faced shortages of food after the rubber concession arrived in their communities.

The respondents indicated that rubber plantation areas contained not only commercial trees but also community forests. Local villagers used these areas for daily livelihood activities such as collecting NTFPs including malva nut, bamboo, mushrooms, firewood, and herbs. In all, 78.0% of farmers and 74.8% of workers (Table 2) indicated that NTFPs collection for household consumption had decreased after rubber concession.

Table 2. Non-Timber Forest Products (NTFPS) Collection on Household Consumption

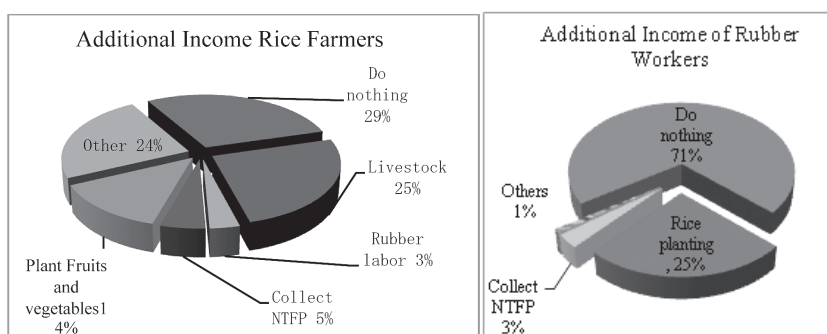
NTFPs collection after rubber concession	Rice farmers (N=59)		Rubber workers (N=99)	
	Frequency	Percentage	Frequency	Percentage
<i>Decreased</i>	46	77.97	74	74.75
<i>Stay the same</i>	10	16.95	20	20.20
<i>Increased</i>	3	5.08	5	5.05
Total	59	100	99	100

Source: field survey, 2010

The introduction of rubber plantations changed household livelihoods and forest benefits in this area regardless of population growth. After the rubber concession, the respondents reported that only 3% of workers and 5% of farmers received additional income from NTFP collection (Figure 1). In addition, it was found that 71% of workers had no free time to earn additional income after finishing their daily work at the rubber company because their working times fully occupied each day, whereas rice farmers were able to earn additional income after their field work from activities such as raising livestock, planting vegetables, and working as rubber employees on a part-time basis.

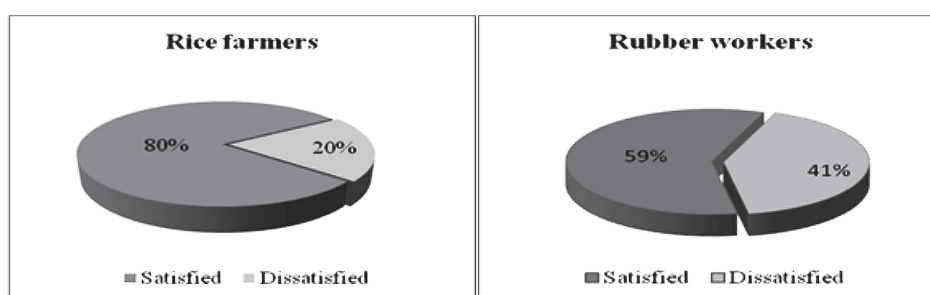
Job satisfaction is a feeling of pleasure and achievement that workers experience in their job. Our survey found that just over half of workers (59%) and most farmers (80%) were satisfied with their job, whereas 41% of workers were dissatisfied because of lower income compared with that derived from their previous activities such as paddy rice cultivation, raising live-

<sup>1</sup> Currency rate: 1 USD = 8,004 kip (source, Banque pour le Commerce Extérieur Lao 07/06/2011)



Source: field survey, 2010

Fig. 1. Other Sources of Income.



Source: field survey, 2010

Fig. 2. Job Satisfaction.

stock, and NTFPs collection (Figure 2).

Household assets are indicators to show lifestyle improvement among respondents; increases in the number of durable assets purchased for the household may be regarded as potentially strong indicators of their income. Our findings revealed that farmers were more likely than workers to have acquired household

items. Differences between the two groups were measured by the percentages having household assets such as land tenure status and other possessions (e.g. TVs, fans, and motorcycles), as well as livestock that each household respondent had purchased (Table 3). A higher percentage of rice farmers had purchased household assets and livestock than had rubber workers.

Table 3. Percent Household Assets

Items	Measuring group	Units	Rice farmers (N=59)	Rubber workers (N=99)
<i>Household assets</i>	Tenure status	%	93.2	84.8
	Fan	%	72.9	44.4
	TV	%	83.1	54.5
	DVD player	%	57.6	43.4
	Refrigerator	%	61	22.2
	Bicycle	%	37.3	22.2
	Motorcycle	%	74.6	48.5
	Car	%	11.9	1
	Tractor	%	23.7	7.1
	Power tiller	%	33.9	19.2
<i>Livestock assets</i>	Chicken	%	67.8	58.6
	Duck	%	45.8	11.1
	Pig	%	32.2	19.2
	Cow	%	42.4	15.2
	Buffalo	%	35.6	16.2

Source: field survey, 2010

**Descriptive Statistical Analysis**

Descriptive statistics on rice production and socio-economic characteristics were prepared. Average profit of rice production was 6,282,088 kip<sup>1</sup> per household per year; on average, there were 3 family laborers involved in each stage of rice production per year while the yield of rice was 2 tons per hectare per year with the selling price at 3,847 kip per kilogram. Meanwhile, the average cost of rice production including amount and price of seed and expenditure on machinery and services was 72,268 kip per year. The average income for a rubber worker was 3,973,232 kip per year. More than half the respondents were in full-time employment and working time per year was 10 months.

**Comparisons on Rice and Rubber Worker Profit**

This section reports on socioeconomic characteristics comparisons between rubber workers and rice farmers. In terms of sex distribution of the respondents, the difference among rice farmers was not high and 53% of respondents were men. Therefore, both men and women play important roles in rice profit production in this study area.

Among workers, greater sex differences were noted compared with rice farmers; stronger encouragement for men than women to work in a rubber company resulted in a 71% male predominance in this group.

There was a considerable difference in the age of respondents between rice farmers and rubber workers. For farmers, age ranged at 18–76 years while for workers the range was 20–48 years (Table 4). The average age of workers, at 32.4 years, was younger than that of rice farmers.

The education level of the respondents was also different between the two groups. The education levels of rice farmers included illiterate, primary school, lower secondary school, upper secondary school, and vocational college, whereas rubber farmers had only three

levels, namely primary school, lower school, and upper secondary school. The percentage of workers educated up to year 5 of primary school was similar for both groups.

Table 5 shows comparisons of total profit and income between the two groups calculated per person per year. Profit of rice farmers was approximately 4,549,870 kip per year; rice production was their main source of income with profitability approximately 2,070,632 kip using labor over 1.1 months. Apart from their work in the paddy fields, farmers used the remaining 10.5 months of the year to find other sources of income (Figure 1), which amounted to 2,497,237 kip. Meanwhile, per person per year income for workers in a rubber company was 4,075,328 kip with 10.1 months' employment in a farm; the remainder of their time was used to find other sources of income valued at 102,096 kip. Evidently, rice farmers could earn a higher profit than rubber workers.

**Regression Results**

Profit from rice production played an important role to household respondents. The regression results showed significant trends between independent and dependent variables. Profit from rice as an independent variable was found to have a negative coefficient statistically significant at 5%. These results follow the conventional finding that seed used, seed price, and service and machinery expenditure play highly important roles in determining profit on rice production, statistically significant at the 1% level, indicating that if any one of these factors increased there could be reduced profit of rice production.

The age of respondents was a positive coefficient statistically significant at the 5% level; the results suggest that older farmers were less adapted to new technology than younger farmers. This might be because older farmers liked to use traditional cultural practices and were not easily able to adopt new practices and modern input to improve profit.

The negative sign for education of the farmers was consistent with our expectation, albeit statistically non-significant. This was probably because low education would confer difficulty for farmers to adopt and utilize improved technology on rice production. Number of family members was non-significant, suggesting that smaller and greater family size did not affect rice production.

**Table 4.** Socioeconomic Comparison

Variable	Rice Farmers	Rubber Workers
<i>Gender</i>	0.53	0.71
<i>Age</i>	44.22	32.36
<i>Education</i>	4.59	5.26
<i>Household size</i>	5.90	5.81

Source: field survey, 2010

**Table 5.** Profit Comparison per Year

Description	Rice Farmer		Rubber Worker	
	Rice Production	Other income	Rubber worker	Other income
<i>Labor term</i>	1.07	10.5	10.08	1.92
<i>Profit</i>	2,070,632	2,479,237	3,973,232	102,096
<i>Total profit (kip)<sup>1</sup></i>	4,549,870		4,075,328	

Source: field survey, 2010

**Table 6.** OLS Regression on Rice Farmers Profit Model

Variables	Descriptions	Coefficients	Std. Error	t Stat	Significant
<i>Intercept</i>		-1857.92	730.99	-2.54	**
<i>SEED</i>	<i>Seed price</i>	25.70	8.87	2.90	***
<i>SEEDU</i>	<i>Seed used</i>	2515.62	304.63	8.26	***
<i>SERVICE</i>	<i>Other expenditure</i>	0.00	0.00	-1.97	**
<i>LABOR</i>	<i>labor</i>	1.14	4.80	0.24	
<i>AREA</i>	<i>Rice area</i>	-98.68	77.78	-1.27	
<i>AGE</i>	<i>Age</i>	7.31	4.03	1.81	**
<i>EDUCATION</i>	<i>Education</i>	-11.48	17.71	-0.65	
<i>HHSIZE</i>	<i>Household size</i>	25.77	57.62	0.45	
<i>GENDER</i>	<i>Gender</i>	64.66	92.80	0.70	
<i>R Square</i> =		0.640			

Source: own estimated, 2010

Notes: \* Statistically significant at 10% level.

\*\* Statistically significant at 5% level.

\*\*\* Statistically significant at 1% level.

### Rubber Worker Function

Income from working in rubber farm was a dependent variable that was statistically significant at 1% level.

Five of eight variables included in the model of rubber workers' profit were statistically significant. Working hours had a positive coefficient of 2926.76 that was significant at 1% level. This probably indicates that high working hours did not increase profit of the respondents because the wage rate was calculated per day and there was no payment for overtime work.

The test of the null hypothesis  $H_0: \beta_1=0$  versus  $H_1: \beta_1 \neq 0$  was calculated, and indicated that the slope of seed used in the regression line had  $\alpha=0.01$  level of significance. Because the  $t$ -statistic ( $t=8.26$ ) was greater than the critical value  $t_{48,0.01} = \pm 2.678$ , we reject  $H_0$  and conclude that the seed use elasticity was positive at the 1% level of significance. For seed price, the  $t$  statistic value was 2.90, which was greater than the critical value of  $t = \pm 2.678$  at the 1% level of significance, therefore we can reject the null hypothesis.

The negative coefficient of education was non-significant, possibly because rubber work was still a new activity for farmers who may have had learned few techniques and skills for such work.

Age of respondents had a negative coefficient (-31.97), but was statistically significant at 5% level, implying that younger farmers lacked experience of rubber planting work.

The coefficient of household size was positive but non-significant, possibly because the number of laborers in respondents' families was rather low, so this variable did not affect income from this activity.

The coefficient of sex was positive at 604.99 and significant at the 5% level, and was correlated to profit among rubber workers. The finding implied that a 1% increase in working hours resulted in men being more attracted to work in rubber farms than women; possibly indicating that men were more amenable to hard work than women.

Responsibility of work had a negative sign and was

**Table 7.** OLS Regression on Rubber Workers' Profit

Variables	Descriptions	Coefficients	Std. Error	T-value	Significant
<i>Intercept</i>		-23684.50	3055.01	-7.75	***
<i>WORKH</i>	<i>Working hours</i>	2926.76	307.77	9.98	***
<i>EDUCATION</i>	<i>Education</i>	-15.51	52.85	-0.29	
<i>AGE</i>	<i>Age</i>	-31.97	18.63	-1.72	**
<i>HHSIZE</i>	<i>Household size</i>	47.55	67.48	0.70	
<i>GENDER</i>	<i>Gender</i>	604.99	532.61	1.97	**
<i>JOB</i>	<i>Type of work</i>	-837.05	367.72	-1.57	
<i>RESPONS</i>	<i>Responsibility</i>	-822.34	293.19	-2.24	**
<i>R Square</i> =		0.577			

Source: own estimated, 2010.

Notes: \* Statistically significant at 10% level.

\*\* Statistically significant at 5% level.

\*\*\* Statistically significant at 1% level.

significant at the 5% level. The survey disclosed that there were several kinds of work such as clearing grass, planting rubber, spraying fertilizer, and tapping in the cycle of rubber production; this suggests that workers who had more responsibility could earn more profit than those who had less responsibility in their work.

#### CONCLUSIONS AND POLICY RECOMMENDATION

Our assessment of job satisfaction among local communities after agricultural land was converted to rubber concession found that rice farmers were more satisfied on their jobs than rubber workers because the average income from being a rubber worker was still low compared with their previous activities such as rice planting, raising livestock, NTFP collection, planting vegetables, and working part-time on a rubber farm. While workers spent most of their working time on the rubber farm, rice farmers had more spare time to find other sources of income; over the whole year, rice farmers could bring home more benefits than rubber farmers. Respondents in the workers group were younger than farmers, suggesting that older farmers were not hired to work in rubber companies. After land concessions were made, the agricultural area for commodities decreased, indicating that rubber workers were dissatisfied with their job and income activities compared with beforehand.

This study investigated the socioeconomic characteristics influencing profits on rice production and income from working in a rubber company, and found that input variables such as seed used, price, other expenditures, and age of the respondents were statistically significant. This implies that if any one of these factors were changed (increased/decreased), it could affect profit on rice production. Becoming rubber employees and quickly adapting to rubber production were difficult issues for local people. The average age of respondents who were able to work in a rubber company was 32.4 years, and this parameter considerably affected income from work. The proportion of male workers was higher than female workers and statistically affected income. This would be a barrier for women if they wanted to earn more income for their families. Working hours and responsibility of rubber workers were significant factors; we observed that if these factors were increased they could affect income of workers in a rubber company. However, based on these findings we can conclude that rice production, the traditional activity of farmers, was still the more beneficial job compared with employment or work in a company over the long term, and farmers were more satisfied with their jobs than workers.

The fast development of rubber concessions has changed local communities and caused difficulties as those communities struggle to adapt quickly to the new situation. To reduce the income gap between rubber

workers and rice farmers, the following recommendations should be considered: first, rubber production companies should expand local employment, especially to increase participation of women laborers in work on rubber farms. Wages of rubber workers should be improved. Rubber plantations are not the traditional form of agriculture for local people; therefore, improving the technical skills of rubber workers and local people who are interested in rubber plantations through training in rubber management should be introduced. Second, rubber concessions cause losses of local communities' agricultural land, and compensation is low. Concerned sectors should find new approaches to provide alternative livelihood opportunities and sources of credit to supplement farmers' income, for example handicrafts or weaving. In addition, this would reduce the potential for conflict between rubber companies and local communities.

Land concession profoundly affects local communities who traditionally depend on land resources and forests to provide their livelihood. The government should be concerned about land-use rights for these households. Proposed concessions should be monitored before approval to make sure that they do not encroach substantially on local agricultural areas. Concession on rubber plantation might be reduced to a smaller scale to protect communities' interests such as benefits from forests and environmental sustainability.

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