



Negative Impact of Forest Land Use Change on Household Income in Kratie, Cambodia

HUN RASMEY

*Royal University of Agriculture, Phnom Penh, Cambodia
Email: smeygidar@yahoo.com*

ETIENNE SAUR, COLAS CHERVIER

Royal University of Agriculture, Phnom Penh, Cambodia

MAK SOLIENG

Freelance Consultant, Natural Resource Planner, Cambodia

ROBERT GILBERT

The University of Queensland, Center for Nutrition and Food Sciences, Brisbane, Australia

Received 31 December 2009 Accepted 25 July 2010

Abstract Land use pattern in the upland area of Kratie Province consists of forest, grazing, shrub and farming land. Due to economic development and demographic pressure, the use, access and control of the forest land have changed significantly. The main objectives are (1) to analyze the impact of the change in land-use on use and extraction of non-timber forest products, (2) to analyze the impact of the change in land-use on livelihood of each type. Structured questionnaires were used on 75 respondents stratified into four sub-groups: *resin tapper, former tapper, never tapped* and *immigrant*. Three kinds of forest changes were noticed in the study area. Firstly, forest land was converted to plantation by economic land concession. Secondly, forest was converted to Chamkar and rice growing by farmers. Finally, forest and resin trees of households were destroyed by illegal logging. Commune statistics (2008) showed that 41% of total area was under economic land concession. Furthermore, the average area of Chamkar has been enlarged from 0.44 to 1.30 hectare per households per period of time. The study also shows a problem with resin trees which decreased from more than 160 to only 20 trees per household. Furthermore, the number of resin of tapper was decreased from more than 360 to only 130 trees per household. The income of former tapper from collecting non-timber forest products decreased from approximately 35% (1000 USD/year) to 0.64% (20 USD/year). The result shows significant change on the income of resin tapper from 42.9% (1200 USD/year) to 34.9% (813 USD/year) even though the price of resin increased, which doubled since 2004-2009. In conclusion, changing in forest land-use strongly affected household livelihoods.

Keywords deforestation, land use change, household income, Cambodia

INTRODUCTION

Forest land covered an estimated 73% of Cambodia in 1965, but this amount declined to an estimated 61% of total land area in 2002 (TWD F&E, 2007). Furthermore, Cambodia is moving further and further from equitable land distribution with the percentage of landless people estimated at an alarming rate of around 20 percent whereas some rich people are holding thousands of hectares (EIC, 2006). The loss of forest cover is significantly related to land use and changes in land cover. These changes are associated with population growth and economic development. Based on economic development, in Ou Krieng Commune, six economic land concession (ELC) companies have been approved on total area of 39 416 ha and three of ELCs are under operation (Commune staticstic, 2009). The change of forest land use led to increased land area for agriculture. According to Sophal et al

(2001), the agricultural land area rose from 3.69 million hectares to 3.91million hectares over this period. NTFPs include a wide array of forest products such as resin, mushrooms, bamboo, rattan, medical plants, wild fruits and vegetables, as well as firewood and wildlife. These products play a vital role in sustaining rural communities in Cambodia especially those living close to forest areas. NTFPs not only serve as a safety net in times of food shortage, but also as valuable source of household materials and income.

METHODOLOGY

Household level study was conducted in O Pres village, Ou Krieng commune Sambour district, Kratie Province. With feasibility study, coordination of the chief of village, community forestry leaders and key informants households were categorized into four sub-groups: resin tapper, former tapper, never tapped and immigrant. The target area has totally 498 households. 15% of households were randomly selected from each stratum which include 41 former tapper, 15 never tapper, 11 resin tapper and 8 immigrant. In total, 75 respondents have been interviewed with structure-questionnaire.

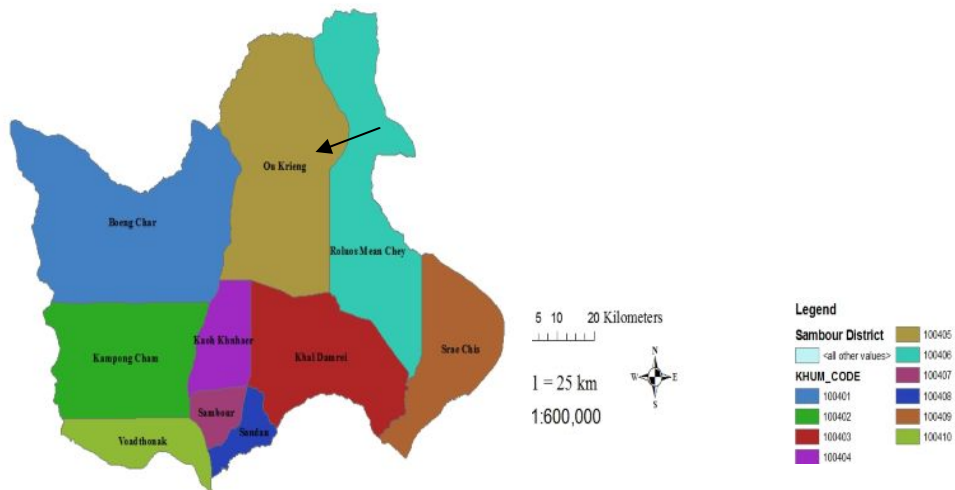


Fig. 1 Map of the study area

Research was conducted in the middle of 2009. The period of time from 2004-2009 was divided into two mean times by the event of economic land concession started in 2006. The first mean time was 2004, 2005 and 2006 and the second was 2007, 2008 and 2009. During the period of three years before and after the end of 2006, households were asked about non-timber forest products collections, yield from rice and Chamkar, cattle production, logging activity and other activities to determine the difference between the two mean times.

The total average income composed by rice production, chamkar farming, cattle production, other activities or occupation, logging and collecting non timber forest product, the income of each activity was calculated in average based on the time frame. Total household income was determined and accounted for in average from three year of each time frame.

$$A = B \times P \quad (1)$$

A: Average income before/after 2006 for the period from 2004-2009

B: Average yield/quantity/number before/after 2006 for the period from 2004-2009

P: Price per unit at the time before/after 2006 for the period from 2004-09

For logging and collecting NTFPs, B could be calculated as bellow:

$$B = C \times D \times M \quad (2)$$

C: Average quantity per day

D: Number of times of access to forest per month

M: Number of times of access to forest per year

RESULT AND DISCUSSION

The income of former tapper from resin production had fallen from 907 USD to Zero USD per year. Even the average price of resin per kan (1 kan =30litre) were almost double from 6 USD (price in 2006) to 11 USD (price 2009), but the income of resin tapper showed slightly decline from the average of 1 054 USD to only 788 USD per year (Fig. 2). The average number of resin of all types (75 households) decreased from more than 160 to only 20 trees per household. Furthermore, the amount of resin tree of resin tapper decreased from more than 360 to 130 trees per household. CDRI, 2002 showed number of tree possessed by households range from 300-700 trees. The amount showed similar result but the amount have decreased. The decrease led to resin production decline to an alarming point. The relationship between annual income and number of resin between before and after the end of 2006 was larger than triple. R linear of before the end of 2006 was only 0.15, but R linear of after was 0.48 (Fig. 2). The difference indicated that resin trees become important source of income while they could not extract enough resin. As a result, before the early of 2007, most household especially former tapper and resin tapper could earn more than two million riel from the production but the amount of the income had changed. After the early part of 2007, there were only few households that could earn from 2-6 million riel per year (Fig. 2).

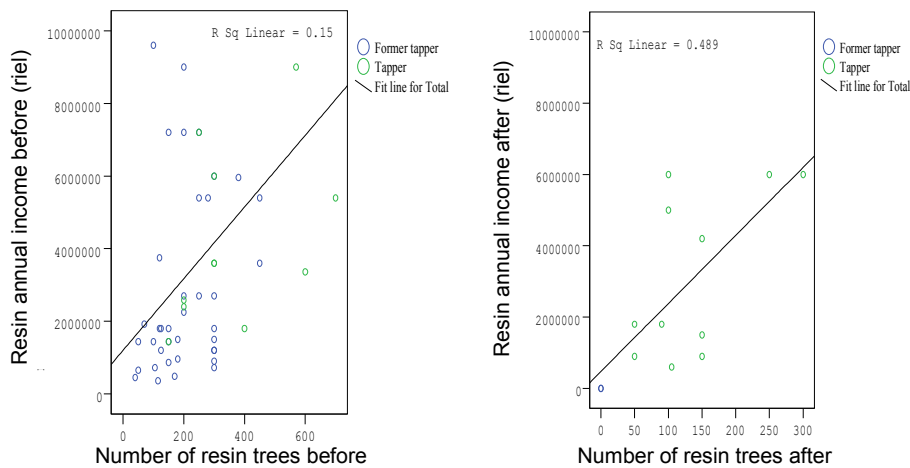


Fig. 2 Comparison of income from resin production before and after early part of 2007

Households noted that the price of resin increase doubled while some of tapper groups cannot collect and support current requirement. For instance, Oxfam GB has created a group who save and buy resin from members but they could collect only approximately 20-30 Kan per month per all resin tappers. The previous amount was collected for only a week per household. There are two main causes of the decrease. Firstly, most resin trees of both former tapper and resin tapper were cut down and this is continuing. Loggers harvest resin trees because they are a commercially attractive source of timber (CFI, 2006). Secondly, the age of resin tree is young and the size of resin tree that resin tapper have collected is too small which can produce small amount of resin per cycle. For instance, some of resin tapper said that while their resin trees are in good condition, they can make a surface on the resin tree bigger than 50 centimeters, but currently it is only 20-30 centimeters.

Beside resin, the amount of rattan showed significant difference with $p < 0.01$ if comparing the amount collected between before and after the end of 2006. The average amount of rattan collected by households before 2006 was 7 bunches per year but the currently average collected was only 1 bunch per year. In addition, wild vegetables also showed significant decrease with $p < 0.001$. For instance, the average amount of wild vegetable collected by resin tapper decreased from 6 to 3 per year. The amount of wild animal also decreased more than triple from 23-7 kilograms per year with $p < 0.001$. For example, the average amount of wild animals collected by never tapper shapely decreased from 14 kilograms to 2 kilograms and for former tapper decreased from 20 kilograms to 6 kilograms per year.

Even resin tapper group collected the highest among the types both before and after 2006 but showed significant decrease from 55 kilograms to 14 kilograms per year. Bamboo is mostly used for fence which is collected one time per year especially in the months of May or June while householders leave their homes to start rice farming activity. The average number of bamboo collection decreased from 84 to 48 trees with significant value $p < 0.001$. The immigrants did not collect any kind of NTFPs because they are new and face some difficulty in the collection. However, resin tapper, former tapper and never tapper who the original groups said that NTFPs currently decreased to an alarming point include resin, chorchong, wild animal and rattan. They added that there is not enough land area for the kind of NTFPs because it is almost owned by the concession land companies which some area had already removed and replaced by rubber plantation. On the whole, the current income of resin taper from both collecting NTFPs and resin production were noted at about 813 USD per year which is approximately 2.25 USD per day. The amount of income mostly equal to the amount of research done by SROSHRC, 2007, and depending on the area and provinces, communities have reported that they can earn up to 2.50 per day by tapping resin trees and selling NTFPs. If comparing to the income before the end of 2006 the income has declined approximately 1 USD per day per household in resin tappers' livelihood.

The total livelihood income comprised of rice production, chamkar farming, cattle production, other activities or occupation, logging and collecting non-timber forest products. This income level of households differed base on the types and time scale. The total income of never tapper increased from 2 167 USD to 3 014 USD. It got in line with the income of immigrant which increased from 59.5 USD to 1 015 USD per year. Furthermore, there is slight increase in the amount of income of former tapper from 2 974 USD to 3 136 USD per year. Anyway, the average income of resin tapper decreased from 2 799 to 2 325 USD per year. Even though the result showed positive mean but this amount was covered only from cattle production which increased doubly in price. CDRI, 2002 showed that rural households rely heavily on hiring out labour and access to common property resources (CPR).

In detail, the current income of never tapper was covered by cattle production (68.21%). The average income from collecting NTFP decreased from 197 USD to zero per year. Furthermore, the research found some negative change on the income of former tapper. The income from collecting NTFPs of the group decreased extremely from 1050 USD (35.9%) to only 20 USD (0.64%). In addition, the income of resin taper from collecting NTFP decreased from 1 201 USD (42.93%) to only 813 USD (34.96%) per year. The amount of income contributed mainly to support the standard of living of householders. Forest products account for nearly half of household income (42-48 percent) in each of the three high-value forest areas (CDRI and CWS 2004) but there are indications that household income could not lift householders out of poverty even the income was derived from Amazon Company (Morsello, 2006).

Table 1 Percentage change of income contribute to household livelihood

	Never Tapper		Former Tapper		Resin Tapper		Immigrant	
	BF	AF	BF	AF	BF	AF	BF	AF
Rice farming (%)	7.82	0.73	7.04	5.86	9.25	9.48	0	0.87
Chamkar farming (%)	0.38	0.64	0.55	0.62	0.3	0.34	63	16.63
Cattle Production (%)	61.35	68.21	41.68	75.58	36.29	49.46	0	28.33
Wood Logging (%)	4.61	5.97	5.98	5.20	11.04	3.71	0	11.08
Collecting NTFPs (%)	9.09	0	35.19	0.64	42.93	34.96	0	0
Other activities (%)	16.74	24.43	9.53	12.1	0.16	2.03	37	43.07

Never Tapper: Households who never access to forest for tapping activity.

Former Tapper: Households who used to access to forest for tapping activity but have stopped because of some causes.

Resin Tapper: Households who still access to forest for tapping activity.

BF: Before ECL started for 2004-2006, AF: After ECL started for 2007-2009.

Chamkar: Can vary here it is referring to the technique in upland areas rice and vegetable farming in a single field.

The immigrant group moved into the village mostly in the early part of 2007. The income generally showed positive growth. The group did not focus on collecting NTFPs but on Chamkar farming.

Most income source of householders in the study area showed that there is significant decrease in the amount collected in wood logging and NTFPs collection. As the research found, NTFPs include resin tree of resin tapper which showed decreased doubly from more than 360 to 130 trees per household, and the amount of wild animal also decreased more than triple from 23 kilograms to 7 kilograms per year with $p < 0.001$. However, it could not cause significant change while the price of each item based on the each duration increased by double.

CONCLUSION

The changing in the use of forest land in the study sites was a consequence that impact household livelihoods in access to NTFPs. The percentages of household who access to resin production have decreased from 70-15 percent. Three types of respondents excluding immigrant were under impacted. Even resin tapper could produce resin with double price increase but the income was still lower. This problem may have a prolong impact if community forestry was not fully recognized by the Royal Government of Cambodia that would enable them to start community forestry management plan. In addition, the changing in the use of forest declined the average amount of cattle almost by double with many reasons but the most important one was the decreasing forage area. Pushing up with vegetable and animal production getting a line with irrigation or wells development was a good opportunity to contribute to improve livelihood besides collecting NTFPs.

ACKNOWLEDGEMENTS

We would like to indicate my sincere thanks to OXFAM GB and colleagues, for their fund support, kind help and constructive comment during the research.

REFERENCES

- Chan Sophal, Tep Saravy and Sarthi Acharya (2001) Land tenure in Cambodia, Cambodia Development Resource Institute, Phnom Penh, Cambodia.
- Carla Morsello (2006) Company–community non-timber forest product deals in the Brazilian Amazon, A review of opportunities and problems. Forest Policy and Economics, Cidade Universita´ria, Brazil, 485-494.
- CDRI (2002) Facing the challenge of rural livelihoods, A perspective from nine villages in Cambodia. Cambodia Development Resources Institute, Phnom Penh, Cambodia.
- CDRI and WCS (2004) Focusing on Cambodia’s high Value Forest, Livelihood and Management. Cambodia Development Resources Institute, Phnom Penh, Cambodia.
- CFI (2006) Proceeding of Non Timber Forest Products (NTFP) workshop and Seminar, Community Forestry International, Phnom Penh, Cambodia.
- EIC (2006) Land and natural resource management reform. Cambodia Economic Watch, Phnom Penh, Cambodia.
- SROSHRC (2007) Economic land concessions in Cambodia, A human rights perspective. Special Representative of the Secretary for human rights in Cambodia, Phnom Penh, Cambodia.