Research article

Assessment of Local Livelihood of Forest-Dependent Communities in Cambodia

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Abstract Forests are important sources of ecosystem goods and services to billion people around the world. As tropical forests are gradually disappearing while population is increasing, the livelihood of forest-dependent communities is being threatened. Cambodia's forest subsector contributed 8.4% to agricultural GDP over the period from 1999 to 2008. Although this figure provides an indication of the importance of forest resources in national development, assessment of the detailed contribution of forest goods and services at the local level is urgently needed so that appropriate intervention and development policies could be introduced. The objectives of this study are to better understand the contribution of forest resources to household livelihood by classifying such contribution to four main forest and non-forest products and to propose a policy recommendation. Questionnaires were developed to interview 600 households in three communes, namely the Takaen, Sangke Satob, and Tumring in Kampot, Kampong Spoeu, and Kampong Thom provinces, respectively. The interviews were performed quarterly throughout the year so as to increase the accuracy of the responses from the households. Our analysis found that forest income contributed 76,892±8,160 riel or 13% of the total household incomes in the first quarter. However, forest income increased to 24% (142,645±17,540 riel), 33% (146,422±16,967 riel), and 31% (122,512±9,693 Riel) in the second, third and fourth quarters, respectively. Other sources of household incomes were agriculture, outside forest, and other income, all together, contributing 87%, 76%, 67% and 69% of the total incomes in the first, second, third, and fourth quarters, respectively. These findings suggest that forest resources are important sources for the survival of forest-dependent communities. It is recommended that incorporating forest resources into the development planning with the active participation of local people could contribute to sustainable development while protecting the forests.

Keywords forest income, dependence, livelihood, ecosystem

INTRODUCTION

Forests are important sources of ecosystem goods and services to billion people around the world. As tropical forests are gradually disappearing while population is increasing, the livelihood of forest-dependent communities is being threatened. Foreseeing the urgent needs for forest protection, roles of tropical forests for climate change mitigation and sustainable development have been increasingly recognized by world leaders through their efforts to reducing deforestation and forest degradation. The Copenhagen Accord of the United Nations Framework Convention on Climate Change (UNFCCC) recognized a new scheme, the REDD+ or reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks as cost-effective measures for climate change mitigation and sustainable development (Sasaki and Yoshimoto, 2010). At the 16th and 17th Conference of the Parties to the UNFCCC, biodiversity and socio-economic safeguards was one of

the major components of the REDD+ negotiations because it is an important component for achieving the REDD+ objectives.

Extreme weather such as storm, floods, and droughts resulted from the impact of climate change has resulted in decline of agricultural productivities compared to that in the normal year (Heng and Pech, 2009). The decline in agricultural productivities causes more poverty to local people. In order to cope with these natural disasters as well as to improve their livelihood, local people adopted many strategies including increasing their activities for collecting various products from forests and nearby. Activities of local people for collecting various products occur differently throughout the year. For instance, in Kupe, the South of Cameroon, local people increased their activities for collecting forest and non-forest products during the rainy season after crop cultivation because there was little work in the farms except waiting for food crops to mature (Ngane et al., 2012). The situation is not different from local people in Cambodia where about 85% of the total population are farmers. Forests are also important for local livelihood in Cambodia. In addition to providing services, forests are important sources of food, medicine, construction material, and firewood for household consumptions and income generation in Cambodia. Cambodia's forest subsector contributed 8.4% to agricultural GDP over the period from 1999 to 2008 (Theng and Koy, 2011). Unfortunately, rapid deforestation and forest degradation driven by rapid economic development and growing population have put pressure on the resource availability and therefore assessment of the dependency of local people and how their activities for collecting forest and non-forest products is required so that appropriate policy interventions could be adopted.

OBJECTIVES

The objectives of this study are to assess the contribution of forest resources to household livelihood and seasonal variation of this contribution throughout the year.

METHODOLOGIES

Study site: In order to reduce biases in our assessment, study sites were carefully selected taking into account such factors as deforestation rate, threats from industrial cultivation, and distance of local people to the forests. The three selected communes are Takaen, Tumring, and Sangke Satonin Kampot, Kampong Thom, and Kampong Spoeu provinces, respectively (Fig. 1). It was observed that a large rubber plantation has emerged in the site selected in Kampong Thom province while no rubber plantations were found during field survey in other two sites. Based on forest cover changes published by Forestry Administration (FA, 2011), annual deforestation rates in the three provinces from 2006 to 2010 were 0.8%, 0.7%, and 0.3%, respectively. In Tumring commune, some of forest area was converted into rubber plantation.

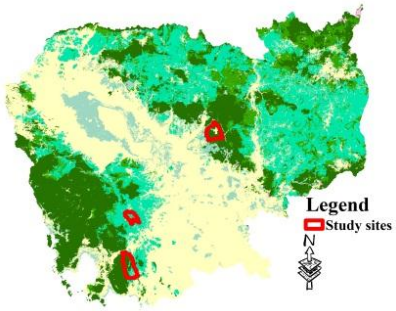

Fig. 1 Map showing study sites

Household selection: National Institute of Statistic (NIS) defined household as a group of persons who commonly live together and take their meals from a commons kitchen unless the exigencies of work prevented any of them from doing so (NIS, 2007). This definition was taken into account for

identifying household for this study. Two hundred households were selected in each study site; and so a total of 600 households were interviewed for this study.

To facilitate the selection of household for survey in each study site, complete lists of household were obtained from village chief prior to carrying out the field work. The first household was randomly drawn from the list while the subsequent households were selected based on the interval of each site.

Interview justification and data collection: Local people in Takaen, Tumring, and Sangke Satob communes have practiced many livelihood activities throughout the year. These activities change seasonally as shown in Fig. 2.

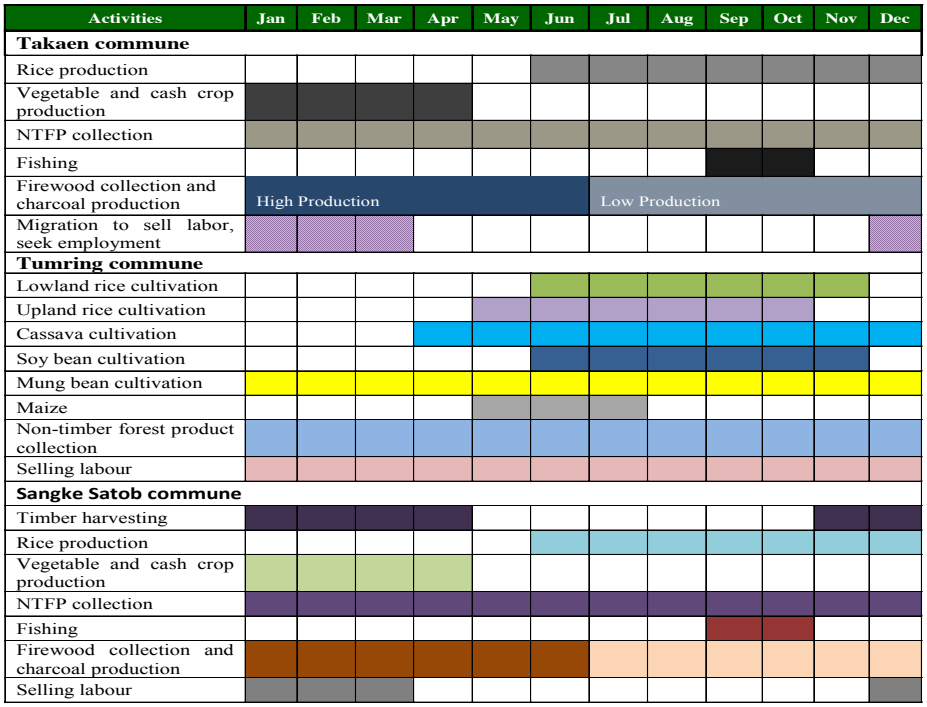

Fig. 2 Livelihood activities in Takaen, Tumring, and SangkeSatob Communes

As livelihood activities change seasonally, data on household income should be collected seasonally. For this study, questionnaire was carefully designed to collect seasonal data of the same household every 3 months (quarterly based interview). Therefore, better data and information were collected. Questionnaire was designed to focus on income generation from four main income sources: i) forest (direct, derived, service payment from forest income); ii) agriculture (crop and livestock); iii) outside forest (fish, aquaculture, and other from non-forest area); and iv) other (wage, own business, and other income). The first data collection was done in January for income generation between October and December, the second, third and fourth interviews were done in late April for income generation from January to March, July for income generation from April to June), and October for income generation from July to September, respectively.

Data analysis: Although 600 households were interviewed in the first round, not all households were interviewed at the subsequent rounds because some of them were not available during the field surveys. For this analysis, only data of households that were interviewed at all four rounds were analyzed. So far, 518 households or 86.3% were interviewed in all quarters.

RESULTS AND DISCUSSION

Income generation in each study site: The study found that the annual average household income

ranges from 1,797,000±44,000 Riel[†] (± refers to standard error) in Takaen commune of Kampot province to 2,564,000±102,000 Riel in Tumring commune of Kampong Thom province (Fig. 3). The contribution from forest to annual average household income ranges from 303,000±22,000 Riel or about 12% of the total income sources in Tumring commune of Kampong Thom Province to 618,000±18,000 Riel or about 34% in Sangke Satob of Kampong Spoeu province. These results confirm that forest resources play a very important role for the rural livelihood in Cambodia.

Specifically, forest was the main income source (618,000±18,000 Riel or about34% of the annual average income) followed by Agriculture (455,000±15,000 Riel or 25%), outside forest (138,000±4,000 Riel accounted to 8%), and other (613,000±23,000 Riel or about 34%), in Sangke Satob commune of Kampong Spoeu province (Fig. 3). In Takaen commune of Kampot province, agriculture was the main income source which contributed to 605,000±20,000 Riel (accounting for 34%) and followed by forest which contributed 512,000± Riel (29% of the annual average income), other (467,000±21,000 Riel or 26%), and income from outside forest (212,000±8,000 Riel or 12%). Figure 3 also shows that the contribution from other to income source in Tumring commune was very high (1,370,000±54,000Riel or about 53% of the annual average income) and followed by agriculture (845,000±73,000 Riel or 33% of the annual average income), forest (303,000±22,000 Riel or 12%), and income from outside forest (45,000±2,000 Riel or 2%). This reflected that the rural activities have a very strong link with natural resources, especially forest. The results of this study showed that the contribution from forest to annual household income was lower than previous study which reported that the annual contribution from forest to household income ranged from 668,000 Riel to 1,696,000 Riel (Kasper and Neth, 2006). This difference could be due to the different methods used in our respective studies or forest condition. Development activities would also have contributed to the variation of forest contribution to household livelihood. However, the results of this study shows higher income contribution from forest than that in Malvi where contribution from forest to poor household was only 15% of the total income (Camanga et al., 2008) and quite similar with Ethiopia where income from forest contributed to 34% of household per capita income (Yemiru et al., 2010). Thus, incorporating forest resources into development planning with the active participation of local people could contribute to sustainable development while protecting the forest.

Seasonal variation in income share: In order to understand the seasonal activities of the local people, we further analyzed the data by four quarters as shown in Fig. 4. It is noted that income was peak in the first quarter in which the average total income was 608,000 Riel and started to decrease in the subsequent quarter while the lowest income was in 4th quarter (392,000 Riel).The analysis found that forest income contributed 76,892±8,160 riel or 13% of the total household incomes in the first quarter. However, forest income increased to 24% (142,645±17,540 riel), 33% (146,422±16,967 riel), and 31% (122,512±9,693 Riel) in the second, third and fourth quarters, respectively. Other sources of household incomes were agriculture, outside forest, and other incomes, all together, contributing to 87%, 76%, 67% and 69% of the total incomes in the first, second, third, and fourth quarters, respectively.

High income in the first and second quarters was contributed mainly by agriculture while contribution from forest plays as a second main income source in quarter 3 and 4 which contributed to 33% and 31%, respectively, to the average total household income. This is because first and second quarter covered the period from October to March which was in harvesting period of agriculture crops while the third and fourth quarter people started investing on planting their crop, especially rice in order to enable them to harvest it within the first and second quarters.

As mentioned previously, the annual average total income in Takaen commune was 1,796,000 Riel in which income share from agriculture was the first main income. The share of agriculture changed seasonally being the first main income source in the first quarter but started to decline the subsequent quarters this is because the first quarter is the rice harvesting period between October to December (Fig. 5). Households sold their agricultural products immediately after harvesting.

[†] USD1 = 4,000 Riel

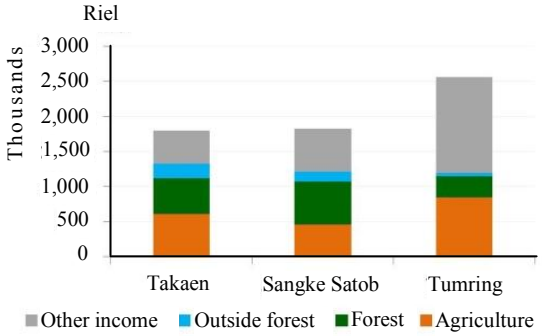

Fig. 3 Annual household income by source in each study site

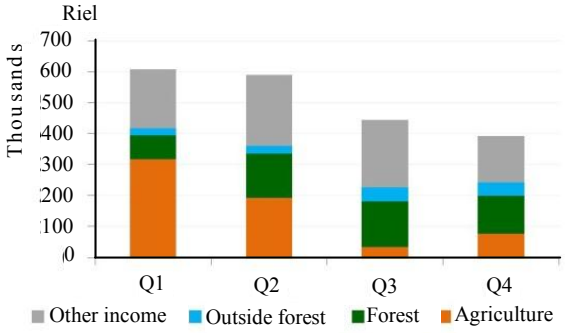

Fig. 4 Average total income by quarter

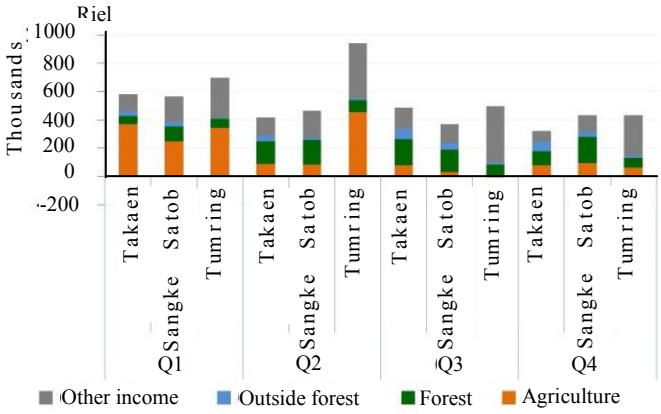

Fig. 5 Seasonal variation in income share in each study site

The average share of forest resources to household income in Takaen commune in the first quarter was only 59,831±9,634 Riel (10%) 39% (160,000±35,283 Riel), 39% (187,000±40,023 Riel), and 33% (105,000±11,857 Riel) in the second, third, and fourth quarter, respectively.

Similar to that in Takaen's site, the income share from agriculture in Sangke Satob's site was highest in the first quarter, about 247,000±17,938 Riel (44% of average quarter income) and continued to decline, while the income share from forest increased from 104,000±14,657 Riel (19%) in the first quarter to 171,000±21,800 Riel (37%), 158,000±19,389 Riel (43%) and 181,000±19,470 Riel (43%) in the second, third, and fourth quarters, respectively, (Fig. 5).

Unlike the two sites mentioned above, livelihood in Tumring's site showed more livelihood activities. In addition to producing rice, other cash crops such as maize, cassava, and mung bean were also produced at this site. The annual average total income in this site is much higher than that in the previous sites which was estimated at 2,564,000±102,000 Riel. The share of agricultural income was high in the first and second quarters amounting to 342,124±93,174 Riel (49% of average quarter income) and 451,211±166,026 Riel (48%), respectively. However, this income share show negative (loss) during the third quarter; this is because of natural calamity occurred at this site. Natural calamity disturbed the agricultural production on this site. It is noted that the share from other income source in this study site was very high in almost all quarter if compared with incomes in other two sites. More specifically, the share from other income sources was the first main income source in the third and fourth quarters, respectively accounting for 82% (402,330±74,275 Riel) and 66% (285,825±39,810 Riel) of the total quarters' income.

Our results suggest that collection of forest products varied seasonally across all study sites. These variations were driven by time availability of household and natural resource condition. These findings are similar to that reported by Neang (2009) who found that the quantity of resin flow of individual tree depended on tree location and seasonality. Seasonal variation from forest

contribution to household income found in this study is also the same with Ethiopia and Africa (Yemiru et al., 2010; Timko et al., 2010)

CONCLUSION

Forests have played important roles in local livelihood. Income from forest resource ranges from 12% to 34% of the total incomes depending on forest locations and seasonality. Income from agricultural sources is higher compared to any other sources. However, such income would decline if forests around the agricultural lands are cleared or degraded because forests regulate hydrological cycle and climate for agricultural cultivation. Our findings suggest that forest resources are important sources for the survival of forest-dependent communities. It is recommended that incorporating forest resources into the development planning with the active participation of local people could contribute to sustainable development while protecting the forests. Furthermore as household activities are influenced by the resources availability and people tend to focus on rice cultivation, creating more income generation opportunities for local people after rice cultivation could discourage them from entering forests to collect various products, and therefore deforestation and forest degradation could be reduced.

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