



The Importance of Non-timber Forest Products in Rural Livelihoods and Ecosystem Services at Phnom Prich Wildlife Sanctuary, Cambodia

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Abstract This study aims to answer the research questions as follows: What is the current context of Phnom Prich Wildlife Sanctuary (PPWS)? Where are the most accessible sites of non-timber forest products (NTFPs) over the landscape of PPWS? Who are NTFPs-dependent people? What is the importance of NTFPs in rural livelihoods? What is the contribution of NTFPs in ecosystem services? Analyzed the NTFPs endowment, the open access simulation model was applied. From the 310 sample households, NTFPs dependency and intensity were analyzed through descriptive statistics. Cross tabulation was applied to identify the main users of NTFPs. The role of NTFPs in rural livelihoods and ecosystem services were discussed. The simulation result clearly shows that NTFPs are rich over the landscape, which local people can easily access. Among many types of NTFPs, eight of them are considered as the most importance for rural livelihoods including liquid resin, solid resin, bamboo shoot, bamboo poles, wild honey, orchid flower, fuelwood, and Prich leaf (*Melientha suavis* Pierre). Around 93% of sampled households collect NTFPs for foods, cash incomes, house construction, and farm equipment. NTFPs are the resources not only for the poor but also to all rural households at PPWS. Some of NTFPs also contribute to ecosystem services.

Keywords NTFPs, rural livelihoods, ecosystem services, Phnom Prich Wildlife Sanctuary, Cambodia

INTRODUCTION

Policy makers tend to forget the role of non-timber forest products (NTFPs) because they lack available information on contribution to the daily life of rural people and ecosystem services at national or global levels (De Beer and McDermott, 1996). In Cambodia, about 84% of rural people heavily depend on forest resources, especially on NTFPs for domestic consumption and complementary cash income (MoE, 2011). NTFPs are also an intrinsic part of culture and traditions of forest-based and indigenous communities of Cambodia (EC-FAO, 2002). Local people have collected NTFPs traditionally for various purposes without any statistical recording to the national economy, yet the importance of NTFPs are not recognized well by the policy makers (Tola and McKenney, 2003). Royal government of Cambodia has implemented the forest protection and management in various policies, but they do not include NTFPs in their primary development agenda (FA, 2009). At present, the empirical evidence on the importance of NTFPs is not well documented in Cambodia. The role of NTFPs has traditionally measured regarding direct benefits from only the amount sold. This description does not reflect the real benefits of NTFPs to rural livelihood, national economy, or global ecosystem services. To understand the real importance of NTFPs; first, the uniform category of NTFPs-dependent people must be known because it gives insight into who are actually utilizing these

resources for livelihoods. Then, the role of NTFPs in ecosystem services should also be revealed to reflect the real importance.

OBJECTIVE

The objective of this study is to explore the importance of NTFPs in rural livelihoods and ecosystem services at Phnom Prich Wildlife Sanctuary (PPWS). This study addresses the following questions: What is the current context of rural households in PPWS? Where are the most accessible sites of NTFPs over the landscape of PPWS? Who are NTFPs-dependent people? What is the importance of NTFPs in rural livelihoods? What is the contribution of NTFPs in ecosystem services?

METHODOLOGY

Study Site Selection

Phnom Prich Wildlife Sanctuary (PPWS) is located in the west of Mondulkiri province, north-east Cambodia. The whole areas of PPWS are 2,225km². PPWS has a rich intricate mosaic of forest habitats, which consists of a mosaic of deciduous dipterocarp forest (1027 km²) and wetter semi-evergreen/mixed-deciduous forest (1070 km²) (WWF, 2016). Whilst PPWS regards as the wealth of ecosystems, and it is also of great importance to local communities who thrive to enhance livelihood through extraction of NTFPs. Currently, there are eight community protected areas (CPAs) have been established. However, this study selected six communities including Nglaoaka, Sre Y, Chi Klab, Poutong-Pouhoung, Toul, and Srae Khtong.

Data Collection and Analysis

Fieldworks took place in September 2015, March and April 2016. Questionnaire testing and adjusting were conducted prior to the survey. Secondary data were mainly gathered to produce the NTFPs accessibility map. The types of secondary data were the dataset of forest cover 2010, population centers and road locations over the landscape. Participatory rural appraisals (PRA) were conducted in four focus group discussions from four communities protected areas (CPAs) in the different areas of PPWS. Two primary tools were applied including seasonal calendar and NTFPs accessibility stocks. Structured questionnaire interview were conducted with the 310 sampled households, which were randomly selected from six communities.

Descriptive statistics were used to describe social characteristics of local people in PPWS, the frequency of forest resources dependence, and frequency of people who involved with NTFPs. Then the people-forest relationships were indicated by the seasonal calendar and people's dependence on the forestry resources. The simulation of "Open Access" model in Arc-GIS software (version 10.1) was run to get the map of NTFPs accessibility stock over the landscape of PPWS. The inputs data for processing were current land use and land cover (LULC) 2010, NTFP harvest products stocks (unique value 0, 0.3, 0.5, 0.7, 1), maximum travel distance to the product, population center, road locations and size and legal accessibility for harvesting. The output by whether NTFP resources are abundant in the area or not and how local people make use those resources for their daily life were interpreted. Crosstabs tabulations were used to analyze the people's dependence on the NTFPs, which varies in different categories of households. The importance of NTFPs to rural livelihoods through the types and utilization level of NTFPs was analyzed. Last, the role of NTFPs in ecosystem services by using literature reviews was described.

RESULTS AND DISCUSSION

Current Context of Rural Households in PPWS

Figure 1 shows the current livelihood activities of local people in PPWS. All agricultural activities, including rainfed rice, cash crop, and vegetables are done, in the rainy season. Livestock, fishing, and small business are done in the year-round. People, who were landless or owned small farmland, worked for other farmers especially in the sowing and harvesting periods of the rice crop. Also, local people collected NTFPs in both seasons upon the types of NTFPs. For illustration, bamboo shoot can be collected in the rainy season, but wild honey and Prich leaf (*Melientha suavis* Pierre) are available only in the dry season. Liquid resin, solid resin, bamboo pole, orchid flower, and fuelwood can be collected in year-round. In the dry season, local people often traded liquid resin, solid resin, wild honey, and orchid flower. However, this result indicates that NTFPs play the vital role in livelihood diversification especially during the off-season, when local people are free from farming.

Livelihood Activities	Dry Season (Nov-April)				Rainy Season (May-October)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rainfed Rice												
Chamkar												
Vegetables												
Livestock												
Fishing Activity												
Small Business												
Off-farm												
Liquid Resin												
Solid Resin												
Wild Honey												
Orchid Flower												
Bamboo-Pole												
Bamboo-Shoot												
Prich Leaf												
Fuelwood												

Fig. 1 Seasonal livelihood activities

Noted: Blank, light grey and pattern represent no activity, occasionally activity, and intensively activity respectively

NTFPs Resources Endowment in Phnom Prich Wildlife Sanctuary

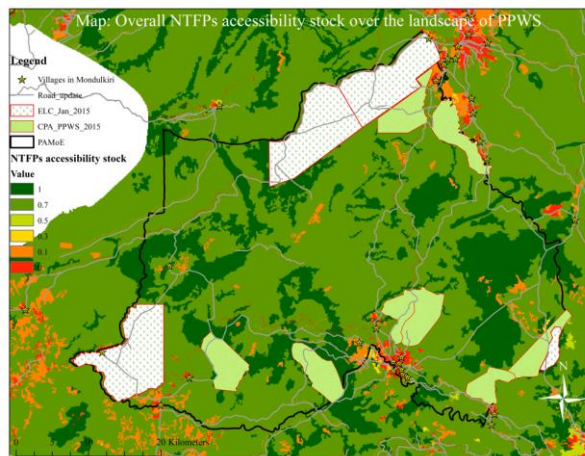


Fig. 2 NTFPs resources endowment in PPWS