Forest Policy and Economics 84 (2017) 92–101

Contents lists available at ScienceDirect

Forest Policy and Economics

journal homepage: www.elsevier.com/locate/forpol

Wild food collection and nutrition under commercial agriculture expansion in agriculture-forest landscapes☆

Rikke Brandt Broegaard [a,*], Laura Vang Rasmussen [b], Neil Dawson [c], Ole Mertz [a], Thoumthone Vongvisouk [a,d], Kenneth Grogan [a]

[a] Department of Geosciences and Natural Resource Management, University of Copenhagen, Øster Voldgade 10, DK-1350 Copenhagen K, Denmark
[b] International Forestry Resources and Institutions (IFRI), School of Natural Resources & Environment, University of Michigan, 440 Church Street, Ann Arbor, MI 48109-1041, USA
[c] School of International Development, University of East Anglia, Norwich Research Park, Norwich, Norfolk NR4 7TJ, UK
[d] Faculty of Forestry, National University of Laos, 7322, Dongdok Campus, Vientiane, Laos

ARTICLE INFO

Article history:
Received 11 May 2016
Received in revised form 3 December 2016
Accepted 19 December 2016
Available online 5 January 2017

Keywords:
Nutrition-sensitive landscape
Shifting cultivation
Cash crop expansion
Conservation policy
Diet
Asia

ABSTRACT

Wild food constitutes a substantial part of household food consumption around the world, but rapid land use changes influence the availability of wild foods, which has implications for smallholders' food and nutrient intake. With increasing commercial agriculture and biodiversity conservation efforts in forested tropical regions, many shifting cultivation systems are being intensified and their extent restricted. Studies examining the consequences of such pressures commonly overlook the diminishing role of wild food. Using a combination of collection diaries, participant observation, remote sensing, and interviews, we examined the role of agriculture-forest landscapes in the provision of wild food in rapidly transforming shifting cultivation communities in northern Laos. We found that wild food contributed less to human diets in areas where pressure on land from commercial agriculture and conservation efforts was more intense. Our results demonstrate that increasing pressure on land creates changes in the shifting cultivation landscape and people's use thereof with negative effects on the quality of nutrition, including protein deficiency, especially in communities adjacent to core conservation areas. Our study shows the importance of adopting a more nutrition-sensitive approach to the linkages between commercial agriculture and biodiversity conservation (and the policies that promote them), wild food provisioning, and food security.

1. Introduction

Nutritional outcomes for rural inhabitants are determined not simply by food production in a landscape or even household incomes, but are highly influenced by access to and control over the resources which make up a person's diet (Sen, 1983). Rapid change is occurring across rural landscapes in the world's developing countries in terms of both land use and governance. Commercial agriculture is rapidly increasing in forested tropical regions, thereby transforming many subsistence-oriented shifting cultivation systems towards more commercial agriculture, often in accordance with national policies aiming at economic growth (Hall, 2011; Hall et al., 2011; van Vliet et al., 2012). These land use changes not only influence local people's income levels and possibly the amount of food purchased, but also affect the availability of wild food as forests, fallows, and agricultural fields are converted to more intensive agriculture (Padoch and Sunderland, 2013). Ickowitz et al. (2014) find a positive relationship between forest cover and dietary diversity in a multi-nation African study. Ironically, however, conserving forests does not guarantee wild food availability. Global efforts to reduce deforestation and increase the proportion of terrestrial land in protected areas, for example through Reduced Emissions from Deforestation and Forest Degradation (REDD+) schemes and Aichi Target 11 of the United Nations Convention on Biological Diversity, often result in a recentralising of control and reduced access to these resources for local populations (Ribot et al., 2006; Sandbrook et al., 2010; West et al., 2006).

Limited attention has been devoted to understanding this intersection between land use change, forest governance, wild food availability, and nutrition (Foran et al., 2014; Sibathu et al., 2015; Vira et al., 2015). The lack of attention to this complex intersection between land use change and adequate nutrition is problematic as it remains unknown how cash crop expansion and conservation efforts change local people's collection of wild foods and what the implications are for diet quality. The consequences may be severe in contexts where subsistence

☆ This article is part of a special feature entitled: "Forest, Food, and Livelihoods" published at the journal Forest Policy and Economics 84C, 2017."

* Corresponding author: Øster Voldgade 10, DK-1350 Copenhagen K, Denmark.
E-mail addresses: rikke.broegaard@ign.ku.dk (R.B. Broegaard), lrasmuss@umich.edu (L.V. Rasmussen), Neil.Dawson@uea.ac.uk (N. Dawson), om@ign.ku.dk (O. Mertz), thvongvisouk@gmail.com (T. Vongvisouk), kennethgrogan@hotmail.com (K. Grogan).

http://dx.doi.org/10.1016/j.forpol.2016.12.012

agriculture and food collection are prevalent and where purchase of varied food items is limited (Shackleton and Pandey, 2014). Despite many scholarly efforts to assess the role of 'bush meat' in rural diets (e.g. Sarti et al., 2015; van Vliet et al., 2015), the need for research on the intersection between land use change and nutrition has only gained attention recently. Further, it has been stressed that such research must take contributions from the entire landscape into account (Padoch and Sunderland, 2013; Sayer et al., 2013; Sibathu et al., 2015; Global Nutrition Report, 2014). Advances have been made with regards to the nutritional contribution of forest foods (e.g. Ickowitz et al., 2014; Rowland et al., 2016); we contribute by also including wild foods from non-forest habitats in our analysis, in part inspired by Powell et al. (2013).

The core of the problem is that increasing incomes from intensified agriculture alone will not necessarily lead to reduced hunger or improved nutrition because many people, particularly those with limited land, capital, and food market-access, may be unable to shift to reliance on markets for suitable and affordable food, and instead continue to rely on access to a diversity of local resources (Pinstrup-Andersen, 2009; Ickowitz et al., 2014, Powell et al., 2015). This means that large proportions of rural populations, despite widespread modernisation of farming practices, continue to rely on forests and other habitats in addition to the agricultural crops to secure adequate food and nutritionally balanced diets for their families. The diverse contribution of wild foods from forest-agriculture landscapes to local diets has been demonstrated by many studies (for example Angelsen et al., 2014; Christensen, 2002; Ickowitz et al., 2016; Lykke et al., 2002; Paumgarten and Shackleton, 2011; Wunder et al., 2014), but it is often overlooked in development efforts, particularly when the contribution is diminishing in the face of widespread, rapid land-use changes and associated alterations in the access and control over food resources (Shackleton et al., 2015; Vira et al., 2015). Wild food, especially meat and fish, has been shown to be important in terms of dietary diversity, even if consumption frequency may be low (Golden et al., 2011; Sarti et al., 2015; Shackleton et al., 2015; van Vliet et al., 2015). Several studies highlight the important contribution of wild food to dietary diversity that risks being lost in a 'nutritional transition' away from locally produced and collected food to purchased food because of modernization and globalization (Piperata et al., 2011; Remis and Jost Robinson, 2014; Sarti et al., 2015; van Vliet et al., 2015). The contribution of forests to income and diet is better thought of as "the supermarket of the wild" rather than as gap-filling (Wunder et al., 2014: S39), and loss and degradation of forest areas can therefore be expected to exacerbate food insecurity and nutrition (Krahn, 2003, 2005; Krahn and Johnson, 2007; Van Noordwijk et al., 2014). In addition, the poor rely heavily on wild food harvested from natural areas other than forests (Angelsen et al., 2014; Mertz et al., 2001). A recent study from Tanzania found that wild foods from agricultural land made a larger dietary contribution than wild foods from forests (Powell et al., 2013).

Achieving all the components of food security is thus highly complex and while economic growth can be shown to reduce food insecurity and improve the average nutritional status of populations (FAO, 2015; WFP, 2007), inclusive growth and attention to local needs and context are fundamental for guaranteeing food and nutrition improvements (FAO, 2015; Dawson et al., 2016). The focus of food security studies has changed from a primary preoccupation with the sufficiency of staple grains and calories, towards the importance of a balanced and safe diet that includes protein, vitamins, and other micronutrients (Ickowitz et al., 2014; Pingali, 2015), with micronutrient deficiency or inadequate nutrition being referred to as the "hidden hunger" (e.g. Ickowitz et al., 2014, p. 287). This is especially relevant for the poorest part of the world's population (FAO, 2015) and Powell et al. (2015) conclude that for developing countries "diversity within rural and agricultural landscapes may be an important part of a food environment that supports healthy dietary choices" (p. 535). They call for more research on how local communities manage their landscapes for supporting healthy diets, or what the Global Nutrition Report (2014) refer to as "nutrition-sensitive landscapes". Analogously, Sayer et al. (2013) highlight food security aspects as an important outcome of integrative landscape and land use planning.

In this paper, we take up this challenge with specific attention to the shifting cultivation systems of Southeast Asia. Northern Laos was selected as our study site as it provides a pertinent experimental area to examine how cash crop expansion and increased conservation efforts change people's use of landscape for food provisioning. These landscapes traditionally delivered a broad variety of wild foods, which formed local populations' subsistence. However, over the past 5–10 years landscapes have experienced rapid land use changes from subsistence-oriented upland rice cultivation towards commercial based maize cultivation happening at a very large scale (as documented by Castella et al., 2013; Lestrelin et al., 2013; Hall, 2011; Schönweger et al., 2012; Vongvisouk et al., 2014). Similarly, the shifting cultivation landscape has been influenced by conservation efforts (Moore et al., 2012). The introduction of cash cropping alongside policies seeking to increase forest cover in Laos have been shown to have had some negative impacts on rural inhabitants' livelihoods and ability to cope with shocks (Castella et al., 2013). Here we examine these political and landscape changes (i.e. the combined influence of biodiversity conservation and cash cropping), with regards to diet and nutrition.

We pose two questions in the article: 1) how does increased pressure on land through conservation efforts and cash crop expansion change local people's use of shifting cultivation landscapes for wild food provisioning? And 2) how is diet quality influenced by changes in the collection of wild food resulting from land pressures? Our main argument is that increased pressures on land through commercial agriculture expansion and conservation efforts reduce the quality of nutrition when local people rely less on wild food derived from the terrestrial landscape without having market-access to diverse, nutritious food. We take a special look at protein, as protein deficient diets have been identified as one of the main risks for rural Laotian communities (Krahn, 2003, 2005).

2. Nutrient sensitive landscapes: The intersection between land use change, wild food collection and nutrition in Laos

The number of undernourished people in Southeast Asia has been more than halved between 1990 and 2015 and this is largely attributed to economic growth (FAO, 2015). The trend is similar for Laos and a study by the World Food Program (WFP) (2007) finds a strong, positive effect of household wealth assets on food security. Many governments place economic growth high on their agenda, and the Government of Laos is no exception. It is firmly committed to lifting Laos out of the ranks of the Least Developed Countries by 2020 and halving the levels of extreme poverty (World Bank, 2014). But the vision of economic growth in Southeast Asia is heavily embedded in large-scale land use changes promoting cash crop production. The Government of Laos, like many other governments of developing countries, actively promotes the expansion of cash crop production (Castella et al., 2013; Vongvisouk et al., 2016), with the general expectation that modernization and intensification of agriculture should transform the lives of smallholders through a green revolution. Such transformations of livelihoods are purported to happen through increasing productivity and incomes, thereby benefitting livelihoods and increasing the consumption of marketed foods and other goods. The dependence on the immediate surroundings for subsistence livelihoods is thereby assumed to decline, and perhaps eventually leading to a shift away from farming. Such large-scale land use changes have been well documented (Castella et al., 2013; Dwyer, 2011; Hall, 2011; Lestrelin et al., 2013; Schönweger et al., 2012). Yet, several studies have also identified negative livelihood impacts that land use changes have had for much of the upland population such as decreased livelihood- and biodiversity which limits the capacity to cope with unexpected events (among them Castella et al.,