



Analysis

Rural livelihoods and environmental resource dependence in Cambodia

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ABSTRACT

Understanding rural livelihood strategies and environmental resource dependence can help to reduce and prevent livelihood stresses induced by environmental resource degradation. This study identifies livelihood strategies of farm households in rural Cambodia and explores their determinants with a focus on environmental resource dependence. The data are derived from a survey of 580 households in 30 villages of Stung Treng province in Cambodia undertaken in 2013. An activity-based two-step cluster analysis is conducted to identify different livelihood clusters and regression models are performed to determine the major factors affecting the choice of livelihood strategies and the extraction of environmental resources. The results demonstrate how different levels of environmental and household capital influence livelihood strategies. Environmental resources contribute a significant portion of household income (27%) and act as a means to reduce income inequality (7%) among households. The absolute environmental income is positively correlated with the total income but the relative environmental income decreases with an increase in total income. Thus, it appears that low income households are not to be blamed for environmental degradation, because they are unable to undertake activities with high return. The findings of this study suggest that promoting off-farm employment, education and social networking reduces the extraction of environmental resources.

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1. Introduction

A detailed understanding of different livelihood activities undertaken by rural households in developing countries is crucial in order to provide useful information for rural development initiatives (Ameha et al., 2014). These initiatives need to be adapted to the livelihoods of the targeted communities and individuals (Nielsen et al., 2013). Even though rural households in developing countries pursue a wide range of livelihood activities (Babulo et al., 2008), there is a common notion that there exist, to some degree, distinct livelihood strategies across rural households (Van den Berg, 2010). The identification of livelihood strategies offers an imperative insight into the policy interventions that may improve rural livelihoods (Soltani et al., 2012). Moreover, by providing a glimpse of the rural livelihood-related constraints and opportunities, the analysis of livelihood strategies is expected to increase the efficiency of the interventions targeted at the improvement of rural livelihoods (Ellis and Manda, 2012; Zenteno et al., 2013).

Environmental resources provide a variety of life-supporting ecosystem services to rural households in developing countries such as timber, non-timber forest products and fish (Babulo et al., 2009; Thondhlana et al., 2012; Nguyen et al., 2013; Bühler et al., 2015). The extraction of environmental resources in rural areas is often considered an important source of income and a means of livelihoods for low income rural

households (Jansen et al., 2006; Kamanga et al., 2009; Naidu, 2011; Schaafsma et al., 2014). However, in many parts of the world, environmental resources have been constantly degraded (WCED (World Commission on Environment and Development), 1987; Beck and Nesmith, 2001; Freeman et al., 2014). Therefore, understanding rural livelihood strategies and environmental resource dependence can help to reduce and prevent livelihood stresses induced by the degradation of environmental resources during the development process, especially for low income households (de Sherbinin et al., 2008; Babigumira et al., 2014).

Even though efforts to quantify the contribution of non-cultivated environments to rural income have been undertaken for decades (Beck, 1994; Beck and Nesmith, 2001; Mamo et al., 2007; Jodha, 2008; Rayamajhi et al., 2012; Thondhlana and Muchapondwa, 2014), some issues still need to be further examined in order to enrich our understanding. These are: (i) the underestimation or ignorance of environmental income. Environmental resources providing income are often communally owned or open access and thus are omitted in rural household surveys, which cover only conventional activities such as crop production and livestock rearing (Babulo et al., 2009; Morsello et al., 2014); and (ii) the factors determining the dependence of rural households on environmental sources are often site-specific (Adhikari et al., 2004; Pouliot and Treue, 2013), which makes the generalization of the research findings difficult (Angelsen et al., 2014). In fact, the generalization of research findings is only possible if the findings from different site-specific studies are pooled in order to identify common observable

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patterns. These issues lead to the need for more empirical evidence based on sound theoretical frameworks and carefully implemented rural household surveys.

Cambodia is one of the least developed countries in the world and is characterized by a relatively low Gross Domestic Product (GDP), a high poverty incidence, and a high dependence on environmental resources (World Bank, 2014). The agricultural sector accounts for about 35% of the GDP and over 80% of the population live in rural areas. With a national forest cover of about 59% (FAO (Food and Agriculture Organization, 2010; Travers et al., 2015) and considerable water resources, Cambodia is rich in environmental resources. The principal water bodies are the Mekong River, the Tonle Sap (Great Lake) and the Tonle–Bassac River, which form together a network of river channels, levees and basins and offer fishing opportunities for the rural population. However, fish and forest resources have significantly decreased over time. This decrease is not only due to the growing rural population, but also to the illegal and unsustainable fishing and timber harvesting activities by commercial enterprises, military and local authorities (McKenney and Tola, 2002; Travers et al., 2011). As a result, rural livelihood activities have been increasingly impaired (Bühler et al., 2015). The contribution of environmental resources to household income has been documented for many parts of the world, particularly for forest and water resources (Babulo et al., 2008; Narain et al., 2008; Kamanga et al., 2009; Völker and Waibel, 2010; Rayamajhi et al., 2012). However, for Cambodia, this contribution is still not more than an estimate (Ra et al., 2011). Information is scarce about the value of environmental resources in terms of overall rural household welfare, and about how their use and value might vary across household types (Cavendish, 2000). Understanding the dependence of the rural Cambodian population on environmental resources is an urgent need. Similar to other developing countries, one of the main environmental and development concerns in Cambodia is to avoid environmental degradation induced livelihood stresses for the rural population due to the overexploitation of environmental resources (Dasgupta et al., 2005; Clements et al., 2010).

This study reports on the livelihood strategies pursued by rural households in Cambodia with a focus on environmental resource extraction. We addressed the following three questions: (i) what are the livelihood strategies of rural households and how are they determined?, (ii) how much is the environmental income and how is it distributed?, and (iii) what are the determinants of environmental resource extraction? The answers to these questions provide useful information for policy makers and practitioners to design effective programs for rural development and environmental conservation in Cambodia.

2. Conceptual Framework

2.1. Livelihood Strategy of a Rural Household

The livelihood approach (Ashley and Carney, 1999; de Sherbinin et al., 2008; Soltani et al., 2012) is used in this paper as a conceptual framework describing the livelihood activity choices (Lambini and Nguyen, 2014) and the factors determining these choices (Nguyen et al., 2010; Wunder et al., 2014). A livelihood is defined as the capabilities, assets, and activities of a means of living (Ashley and Carney, 1999). When applied to developing countries, a rural household in this framework is considered the basic decision making unit regarding production and consumption (Ellis, 2000). In most developing countries, the livelihood of a rural household is linked to environmental resources since the income from agriculture and other sources might not suffice. The livelihood framework includes three closely connected components: livelihood platforms, livelihood strategies and livelihood outcomes (Fig. 1).

The livelihood platforms consist of environmental resources as part of the natural capital (Van den Berg, 2010) and household capital (Ellis, 2000). The natural capital is defined as the natural ecosystems

available to the household and provides a flow of valuable ecosystem goods and services (Turner and Daily, 2008). However, the household might not legally own the respective land, even though it can extract certain types of goods from this capital. In many developing regions, forest and water resources are open access or communally owned (Angelsen et al., 2014). Therefore, the household does not have full control over this capital, but only the limited right to use it (Nguyen, 2008, 2012). The household capital is classified into physical capital (e.g. tractors), human capital (e.g. education), financial capital (e.g. remittances), and social capital (e.g. social network integration).

These different types of capital are the platforms for a household to choose its livelihood strategy as a combination of assets and activities (Brown et al., 2006). A household can allocate its assets to different activity choices, for example, extraction of environmental resources (e.g., collecting forest products and fishing), agricultural production (e.g., crop production and livestock rearing), non-farm self-employment (e.g., cottage industry or small-scale trade), and permanent or temporary off-farm wage employment. Each livelihood strategy selected by the household leads to a set of livelihood outcomes such as the sustainable or unsustainable use of environmental resources.

2.2. Environmental Income as a Part of Rural Livelihoods

Environmental income is generally defined as the income earned from wild or uncultivated environmental resources (Angelsen et al., 2014). Thus, it does not include the income from forest plantations, agricultural fields or aquacultural farms. In contrast, naturally generated forests or surrounding water systems providing readily harvestable goods or services are sources of environmental income (Sjaastad et al., 2005).

Environmental income can be very important for rural low-income households who have little household capital for other livelihood alternatives (Cavendish, 2000; Vedeld et al., 2007). A clear understanding of how low-income households depend on their environment is fundamental in shaping policies aiming to safeguard and develop environmental assets for these households. In particular, environmental income may sustain the livelihood of households during periods of income shortages and act as a safety net against shocks (Wunder et al., 2014). The dependence of rural households on environmental income is mediated by the availability and mobility of household capital under various specific physical and socio-economic factors (Babigumira et al., 2014). A better understanding of the factors determining the environmental dependence of rural households may help to formulate rural development strategies aimed at economic development and nature conservation (Clements et al., 2014; Thondhlana and Muchapondwa, 2014). In this regard, the linkage between rural household livelihood strategies and environmental resource dependence deserves further attention.

3. Study Design

3.1. Study Site

This study was conducted in the province of Stung Treng located in the northeastern part of Cambodia, 500 km from the nation's capital, Phnom Penh (Fig. 2). This province was selected because of its relatively high incidence of poverty (41% in 2009) and high dependence on environmental resources (NCDD (National Committee for Sub-National Democratic Development), 2009; NIS, 2013). The Stung Treng province is remote and sparsely populated, comprising 129 villages in five districts. It is unique with extensive forests (Virachey National Park) and intersecting rivers (Mekong, Sekong, Sesan, and Sreapok).

Stung Treng's economy is largely based on agriculture and extraction of environmental resources from forests and rivers (McKenney and Tola, 2002; NCDD (National Committee for Sub-National Democratic Development), 2009; NIS, 2013). The majority of households (85%)

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