Forest Policy and Economics 86 (2018) 22–34

Contents lists available at ScienceDirect

Forest Policy and Economics

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

Livelihood strategies, ethnicity and rural income: The case of migrant settlers and indigenous populations in the Ecuadorian Amazon

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ARTICLE INFO

Keywords:
Forest conservation
Sustainable development
Indigenous
MLM
Tobit

ABSTRACT

This paper examines the livelihood strategies (LS) of two ethnic groups and explores their implications for forest conservation. We used data from household and community surveys covering migrant colonists and indigenous (Kichwa) people in the Sumaco Biosphere Reserve (SBR) in the central northern Ecuadorian Amazon. Data were collected using the Poverty and Environment Network methodology of the Center for International Forestry Research (CIFOR-PEN). To estimate LS, income proportions of farm portfolios were used in a Principal Components Analysis (PCA) followed by an Agglomerative Hierarchical Clustering (AHC). The results identify four LS based on: forest income, crop production, livestock production and wage labour (off-farm income). The results of a multinomial logit model (MLM) showed that ethnicity has strong influence on their choice of LS, and households with higher physical asset holdings are more likely to engage in more remunerative LS in both ethnicities. Tobit regression show that the ethnic group of Kichwa has US$ 223 higher annual income from Crop-based LS in comparison to colonists. In contrast, colonists earn, on average, US$ 472 per year more from livestock than indigenous households in livestock-based LS and 182 dollars annually more in wage-based LS. Households with greater human capital are more engaged in Wage labour-based LS. Interestingly, residing within the buffer zone of the SBR reduces forest income by US$ 268 in Forest-based LS. The relative remaining forest land is not significantly related to LS. Potential implications of the different activities and composition of household assets in each LS are discussed in order to draw conclusions for equitable development and forest conservation.

1. Introduction

In the last two decades, several studies have examined the links between forests and rural livelihoods (de Sherbinin et al., 2008; Hogarth et al., 2013; Porro et al., 2015; Sunderlin et al., 2005; Thanh et al., 2015; Yemiru et al., 2010; Zenteno et al., 2013). For instance Vedeld et al. (2007) analyzed 54 case studies in 17 tropical countries (seven from Latin America) and found that, on average, 22% of rural income came from forest environment. Seven years later, and in a global analysis using standardized methodologies, Angelsen et al. (2014) found that forests contribute 22% of rural income at the global level and 28% for Latin American countries (seven cases). Babigumira et al. (2014) also identified a relationship between rural livelihoods and forest clearing. In any case, millions of people around the world rely on forests for their livelihoods (Vedeld et al., 2007), and the services they provide (Pan et al., 2011). Therefore, the relation between rural households' livelihoods and forest ecosystems is certainly of interest, with substantial global and political implications.

At the local level, various empirical studies have showed that rural households in tropical countries generate their livelihood strategy (LS) from a diverse range of economic activities (Ellis, 2000; Scoones, 1998), such as: farming (Walelign et al., 2016a; Porro et al., 2015; Thanh et al., 2015), fishing (Sirén and Machoa, 2008), hunting (Sirén, 2012; Sirén et al., 2006; Vasco and Sirén, 2015), producing timber and non-timber forest products (Duchelle et al., 2014; Mejía et al., 2015; Prado et al., 2013; Timko et al., 2010) herding (Lerner et al., 2014; McGroddy et al., 2015; Pacheco and Poccard-Chapuis, 2012; Rudel et al., 2015) and off-farm activities (Holden et al., 2004; Vasco et al., 2015). These studies

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http://dx.doi.org/10.1016/j.forpol.2017.10.011
Received 20 March 2017; Received in revised form 12 September 2017; Accepted 10 October 2017

analyze a variety of the activities that households perform to "*survive and prosper*" inside forest landscapes (de Sherbinin et al., 2008). All of these activities are essential, given their significant contribution to rural living conditions. However, most of them lead to the ongoing conversion of forest to agricultural or grazing lands.

Most researchers have analyzed livelihoods considering the study sites as a whole (Kamanga et al., 2009; Pacheco, 2009; Prado et al., 2013), in some cases separating by ethnicity (Bilsborrow et al., 2004; Gray et al., 2008; Lu et al., 2010; Vasco et al., 2015). However, not all households in a given area experience homogeneous livelihood schemes (Walelign et al., 2016b; Nielsen et al., 2013). To a certain degree, livelihood assets combined with external factors in rural areas promote some patterns in how households obtain their income, with these patterns being recognized as livelihood strategies (LS) (Ellis, 1999). Several approaches are available to group households into LS, in many cases, using two complementary multivariate statistical techniques: principal component analysis (PCA) to reduce the datasets into uncorrelated principal components scores (Kuivanen et al., 2016) and clustering methods, e.g. hierarchical (Walelign, 2016; Kuivanen et al., 2016; Thanh et al., 2015; Zenteno et al., 2013; Yemiru et al., 2010), k-means (Soltani et al., 2012) and latent class clustering approach (Walelign and Jiao, 2017; Jiao et al., 2017; Walelign et al., 2016a; Nielsen et al., 2013).

We investigate these issues in the context of the Sumaco Biosphere Reserve (SBR), an area of about one million hectares located inside the Tropical Andes in the north central Ecuadorian Amazon (Fig. 1), which is considered to be a "leading hotspot" for biodiversity and endemic species (Myers et al., 2000).

The northern and central part of the Ecuadorian Amazon has experienced a process of rapid colonization since the 1960s due to: a) the enactment of Agrarian Reform Laws (1964 and 1972) which promoted the colonization of forest lands; b) the discovery of significant oil reserves by the consortium Texaco-Gulf in 1967 and, c) the construction of roads into previously inaccessible areas by oil companies (Bilsborrow et al., 2004; Pichon, 1997). These factors have led to intense deforestation and land-use change (Mena et al., 2006), as well as fragmentation of farms due to population growth (Bilsborrow et al., 2004; Pan et al., 2007; Pan and Bilsborrow, 2005). This has driven both the Kichwa and migrant settlers to adopt market-oriented livelihood activities (Gray et al., 2008; Izurieta et al., 2014), including off-farm activities which have become the main income source in the Amazon (Torres et al., 2014; Vasco et al., 2015).

Regarding livelihoods and nature conservation, during prior decades, Ecuador has made several efforts towards achieving sustainable development goals. In 2008, Ecuador became the first country to grant legal rights to nature, due to the presence of social environmentalist movements and the power of indigenous organizations who incorporated politicized versions of indigenous beliefs about the environment and the way of life, inducing the kichwa term *sumak kawsay*[1] or living well (in Spanish: buen vivir) (Akchurin, 2015; Gudynas, 2011). As a result, a National Plan of Development referred also as the National Plan for Living Well was developed in Ecuador (Walsh, 2010). These efforts also bring more opportunities to progress towards sustainable development, such as understanding and relating the importance of this national plan to improve livelihoods and conservation in the Ecuadorian Amazon.

In this study we try to address these urgent questions for sustainable development on the basis of the sustainable livelihood framework (SLF). Despite prior studies, there is a lack of empirical information on the role of ethnicity on income in determined LS, in particular for Andean-Amazon countries. We address this gap using a data set covering both indigenous (Kichwa) and migrant settler populations. To the best of our knowledge, this is the first quantitative research in an Amazon country that considers the effect of ethnicity on the households' adoption of LS, the level of income within different LS and the impact of these LS on forest conservation.

With this background, we hypothesize that *ethnicity has strong influence on the households' adoption of LS, and will also affect the level of household income in the determined LS*. Hence, this study aims at a) determining the LS emerging from indigenous (Kichwa) and settler populations, b) examining the factors associated with households' LS choice, and c) evaluating the effect of ethnicity and assets on household incomes in each LS. Finally, the implications of LS for equitable development and forest conservation are discussed.

2. Theoretical framework

Sustainable Livelihood Framework (SLF) is an important theoretical approach to analyze rural LS and their implications for forest conservation (Ashley and Carney, 1999; de Sherbinin et al., 2008; Ellis, 2000; Scoones, 1998 and Soltani et al., 2012). Rural LS in tropical countries are determined by both external factors and the mix of assets (human, social, natural, physical and financial capital) that households use in their on- and off-farm activities, to develop a diverse portfolio of activities for survival or improving their standards of living (Walelign and Jiao, 2017; Nielsen et al., 2013; Davis et al., 2010; Ellis, 1999, 1998). In this context, forest income and income diversification are special characteristics of rural LS in poor countries (Ellis, 2000). Off-farm income usually provides higher earnings than small-scale agriculture (Davis et al., 2010; Reardon, 2001). The core objective of SLF is poverty reduction (Ashley and Carney, 1999). To achieve this goal in tropical rural areas, it is necessary to understand differences in LS between different groups of households. The SLF was first promoted by the Department for International Development (DFID), a United Kingdom government department, in the late 1990s (Ashley and Carney, 1999). This approach has been used by previous studies to describe the LS in rural areas (Walelign, 2016; Thanh et al., 2015; Porro et al., 2015; Zenteno et al., 2013). In this study we consider LS as a dynamic and adaptable concept (Walelign and Jiao, 2017; Jiao et al., 2017; Nielsen et al., 2013) that could change depending of livelihood assets, external context and social groups. We use quantitative data to analyze LS emerging from indigenous (Kichwa) and settler populations under the SLF.

3. Materials and methods

3.1. Study area

The area of SBR was declared as a biosphere reserve by UNESCO's Man and Biosphere program (MAB) in 2000 (Valarezo et al., 2002). Its core area of conservation is the Sumaco Napo Galeras National Park (PNSNG), which was declared 1994[2] with 205,751 ha (Ministerio del Ambiente del Ecuador (MAE), 2013). The SBR is divided between the provinces of Napo (62%), Orellana (35%) and Sucumbíos (3%). It is an interesting site to investigate LS and their relation to forest conservation because: a) the area is ancestrally inhabited by indigenous populations, with almost 50 years of colonization; b) as a biodiversity "hotspot" under severe threat (Mittermeier et al., 1998), it is critically important to recognize LS that have major impacts on forest cover; and c) the current status as a UNESCO Biosphere Reserve promotes biodiversity conservation, sustainable development, education and research, as a means of reconciling humans and nature (Unesco, 1996).

[1] For more on the concepts of *sumak kawsay* (in Spanish "buen vivir"), see Gudynas (2011), and Walsh (2010).

[2] Resolution No. 9, March 2nd, 1994 – Official registration No. 47 of June 28, 1994, INEFAN-Ecuador.