

EXPLORING THE POLITICAL ECONOMY OF EVERYDAY LIFE ON THE COSTA
RICAN FRONTIER FROM AGRARIAN REFORM TO THE PINEAPPLE BOOM

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Abstract

The focus of this dissertation is to understand the process and implications of capitalist incorporation and agrarian change in the frontier region of Northern Costa Rica within the San Juan-La Selva Biological Corridor. Within this larger narrative the analysis focuses on three major themes: agricultural intensification, migration dynamics and family farmers. Data utilized in this analysis includes: community workshops, 35 interviews with government officials, agribusinesses, producer organizations and large landholders, a randomized household survey of 139 households, grey literature, census data and extended participant observation. Key findings are as follows: Structural adjustment reforms have driven a trend of agricultural intensification through the expansion of pineapple, which has led to homogenization of the agricultural matrix's land cover. Pineapple expansion has also increased regional economic dependency on large agribusinesses, created incentives for land turnover, and has drawn labor migrants. These parallel social-ecological changes caused by the expansion of pineapple, undermine the biodiversity of the agricultural matrix and do not facilitate development of the agricultural sector in a way that is inclusive of the diversity of farmers present in the study region. Migrants to this region are largely marginalized populations with low socio-economic indicators of wealth and quality of life. International and internal migrants have come in two general waves; early migrants were seeking land and later migrants were seeking labor opportunities. The earliest migrants in the eldest life stage are faring the worst on the frontier and have not been able to capitalize on their land resources to tangibly improve their quality of life. The family farmer is in peril in this landscape and is primarily participating in traditional domestic markets. Collective organization and state help are critical factors that allow family farmers to persist and prosper in the political economic

and eco-regional context of the frontier. This dissertation provides a model to inform future analysis of coupled human-ecological systems that accounts for social, political and ecological change as coupled parallel processes.

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Any errors in this dissertation are my own.

Dedication

This dissertation is dedicated to Gerardo Vega Chavarria, el zorro, who passed away during my first field season. He was an exemplary Tico of this region, an avid conservationist and birder, jovial conversationalist and storyteller, a dedicated community member and someone who was brave enough to make his life what he dreamed it could be.

May you be in peace.

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Preface

As you begin to summit the Cordillera Central Volcanic mountain range that cuts across central Costa Rica, you see the lowland floodplains of the Río San Juan, Sarapiquí and San Carlos Rivers extend for miles until they reach the Nicaraguan border. Once you get off the main highway that runs between San Jose and the Caribbean side of the country, and pass through Puerto Viejo, the most urbanized rural town in the region, towns become more and more rural as you head North. Close to Puerto Viejo, there are ecotourism businesses, hotels and grocery stores but these amenities rapidly become scarce as you go further. The landscape is dotted with small farms, extensive cattle ranches and tropical forest patches and then periodically opens up into vast pineapple plantations. Busses run in the early morning hours to pick up all the workers for the pineapple plantations and some towns are almost completely dependent on and surrounded by large pineapple plantations. Roads are good near the most populated areas but are terrible to non-existent as you approach the Nicaraguan border. The heat is oppressive until a warm rain each day in the afternoon provides some relief.

Most towns have a community hall, a church and a school. Houses are mostly made of concrete, with tiled floors and tin roofs but there is a lot of variation, with wooden houses, without room separations and dirt floors often being associated with a lower standard of living. Remoteness and community organization create a lot of variation among towns, as some are more populated, more organized, with employment opportunities and others are desolate, barely populated and lack critical infrastructure. Some of the colonies that the government set up to promote settlement in this region are like agricultural ghettos with low populations, where most people are producing subsistence crops, and have to migrate for

work because they are so are geographically and economically isolated. Most towns have *pulperías*, or small grocery stores where you can buy basic food staples, and a cantina where you can find men on a Friday night drinking beer and singing karaoke—mostly ballads of lost love. Cultural events are sparse but several times a year different communities will organize *cabalgatas* or communal horse rides for fundraisers where fifty to one hundred people will ride a designated route through pastures and rainforest over the course of the day. Cowboys, dressed in their best attire, sing as you ride and pass around homemade liquor in a horn flask. At the end there is a celebration and couples dance salsa, bachata and the Costa Rican cumbia.

As you get closer to the Nicaraguan border, the distinction between Nicaragua and Costa Rica is less clear as many families are mixed and many original settlers are Nicaraguan. Most of these areas are heavily forested and roads were only built in the past 15 years so many people relied primarily on river transportation. Most people in these towns hustle for day laborer agricultural jobs and piece together an income. Costa Rican farmers have weathered hands; they work in rubber rain boots and wear their unbuttoned shirts tied up showing their bellies. Pineapple workers, primarily Nicaraguans, wear layers and layers of clothing to protect themselves from the sharp plants as they work in the fields. Women are mostly in the space of the home, as *las almas de la casa*, which translates to the heart or souls of the house. Especially in the more remote areas, women spend their time in domestic work, helping with the farm, volunteering in community development, gossiping with friends and pass the evenings with *telenovelas*, the Spanish soap operas. This is the frontier.

Chapter 1

Coupled Social, Economic and Ecological Outcomes of Agricultural Intensification in Costa Rica and the Future of Biodiversity Conservation in Tropical Agricultural Regions

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Abstract:

Tropical ecosystem conversion to agriculture has caused widespread habitat loss and created fragmented landscapes composed of remnant forest patches embedded in a matrix of agricultural land uses. Export crops such as pineapple are rapidly replacing multiuse landscape matrices comprised of pasture and smallholder crops with intensive monoculture plantations. Using an interdisciplinary approach, we conduct a case study to examine the coupled social and ecological implications of agricultural intensification in this region, with larger application to regions experiencing similar commodity crop expansion and agricultural intensification. Guided by frameworks from both political and landscape ecology, we: 1) describe the social and economic implications of pineapple expansion, specifically the concentration of land, labor and financial resources, 2) quantify pineapple cultivation's spatial characteristics, and 3) assess the effects of pineapple expansion on surrounding forest ecosystems, on the agricultural matrix and on biodiversity conservation. Our results reveal that pineapple expansion produces social and environmental changes that affect local conservation. In particular, our data indicate pineapple production concentrates land, labor, and financial resources, which has a homogenizing effect on agricultural economy in the study region. This constrains alternative farm-based livelihoods, with larger implications for food security and agricultural diversity. Landscape ecology analyses further reveal how pineapple production simplifies and homogenizes the agricultural matrix between forest patches, which is likely to have a negative effect on biodiversity. To offset the effects of

pineapple expansion on social and environmental systems, we recommend developing the capacity for landscape level land use planning. Furthermore, agricultural and conservation policy reform is needed to promote landscape heterogeneity and economic diversity within the agricultural sector. Our interdisciplinary research provides a detailed examination of the social and ecological impacts of agricultural intensification in a tropical landscape, and offers recommendations for improvement relevant not only to our study region but to the many other tropical landscapes currently undergoing agricultural intensification.

Keywords: Agricultural Intensification, Biodiversity Conservation, Non-traditional Agricultural Exports, Rural Livelihoods, Pineapple, Costa Rica, Land Use Change, Commodity Crop Expansion

1. Introduction

Tropical forests cover less than 23% of the earth's surface, but contain over 50% of its biodiversity and provide essential ecosystem services to the entire globe (Mace et al., 2005). As human populations continue to grow, the demand for food has driven an increase in croplands from an estimated 400 to 1,800 million hectares (ha) globally (Lambin et al., 2003). Recently, much of this growth has occurred in tropical regions. The conversion of tropical ecosystems to agriculture has caused widespread habitat loss and created fragmented landscapes composed of remnant forest patches embedded in a matrix of agricultural land uses. In recent years, a new pattern has emerged whereby pasture and smallholder cropping systems are rapidly being replaced by intensive monoculture plantation agriculture (Brannstorm, 2009; Fagan et al., 2013). Impacts of agricultural intensification¹ on social and ecological systems are not well understood, but preliminary studies suggest that intensive plantation agriculture may drive demographic and economic change in local human communities (Hecht et al., 2005; Brannstrom, 2009) and affect the structure and function of remnant forest (Tschardt et al., 2012) and landscapes (Fahrig et al. 2011).

A primary driver of agricultural intensification in the tropics is the increased production of non-traditional agricultural export (NTAE²) crops (Thrupp, 1995; Morton et al., 2006; MEA, 2007; Galford et al., 2010). From a policy standpoint, NTAE crop production is viewed as an opportunity for raising farm incomes in developing countries in the tropics,

¹ Intensification is defined as a process where the unit of production increases per unit of land area (i.e., yield/hectare). If used in another sense referring to intensive production with respect to labor or financial capital it will be specified as such.

² NTAE crops are those that have not previously been central in a country's export profile, such as fresh tropical fruit or off-season temperate fruit, ornamental foliage, oil palm or biofuels.

which have the attraction of low labor costs and an extended growing season (Thrupp, 1995). Tropical countries therefore now dominate global NTAE production (FAO, 2011), and NTAE crops have become a major driver of economic globalization by closely linking tropical agricultural producers to consumers in temperate locations.

While NTAEs have the potential to positively affect rural economic conditions and livelihoods, their effects on biodiversity conservation are largely negative. One hypothesis is that agricultural intensification increases production efficiencies and therefore may decrease the need for additional deforestation for agricultural expansion, reducing pressure on surrounding ecosystems (Matson and Vitousek, 2006; Grau and Aide, 2008). However, NTAEs are generally produced on a large scale, to accommodate greater mechanization and to maximize profits. These increases in productivity ultimately stimulate more demand for land, rather than incentivizing individuals and firms to spare land for conservation (Lambin and Meyfroidt, 2011). Therefore, NTAE production can result in simultaneous agricultural intensification and expansion, a process which homogenizes the agricultural matrix, reduces total forest cover in the landscape, and increases the isolation of native plant and animal species in remnant forest patches. This sequence of events challenges the ‘intensification-land sparing’ hypothesis (Matson and Vitousek, 2006) and underscores the importance of evaluating the socio-ecological impacts of NTAE-driven agricultural intensification in the tropics.

Although the ecological impacts are not well understood, preliminary studies show that intensively managed monoculture plantations with high agrochemical inputs can exacerbate biodiversity loss (Tilman et al., 2002; Ormerod et al., 2003; Jackson et al., 2012; Karp et al., 2012), impede native species’ movement across the landscape (Vaughan et al., 2007), increase habitat fragmentation (Morton et al., 2006), and degrade soil and water quality (Hyden et al., 1993; Polidoro et al., 2008). However, it may be possible to retain the economic benefits derived from intensive plantation agriculture’s productivity increases while reducing negative impacts on surrounding ecosystems. For example, practices such as retaining live fences, scattered trees, and riparian corridors amongst agricultural fields can enhance some components of biodiversity in agricultural landscapes (Harvey et al., 2006; Chazdon et al., 2009a). In some cases, these changes also lead to higher yields or economic returns, indicating that complementary goals of maintaining ecological integrity and agricultural

production may be possible (Harvey and Villalobos, 2007; Robson and Berkes, 2011; van Vliet et al., 2012).

To identify policy and management options that allow for continued rural development and increases in agricultural productivity while mitigating impacts on tropical ecosystems, we need a better understanding of the relationships between NTAE production, agricultural intensification, and biodiversity conservation (Harvey et al., 2006). Such complex problems require an integrated, interdisciplinary approach that recognizes the interdependence of social, economic, and ecological processes inherent in the system (Eigenbrode et al., 2007; Ostrom, 2007; Botey et al., 2014). In this study, we utilize such an approach. We first employ a political ecology (PE) analysis to examine the socio-economic implications of intensification from the perspective of local actors in the San Juan-La Selva (SJLS) region in Costa Rica, a rapidly developing agricultural zone where important conservation areas also exist. We then utilize landscape ecology (LE) to quantify and discuss the ecological implications of the composition and configuration of the dominant land cover types in the SJLS region with a special focus on pineapple, the dominant NTAE. Our ultimate goal is to describe the social and ecological impacts of intensification in this system that are also relevant to other tropical regions where agricultural intensification is now occurring due to NTAE production. Our specific objectives are to: 1) describe the social and economic implications of pineapple expansion, specifically the distribution and concentration of land, labor and financial resources, 2) quantify the spatial characteristics of pineapple cultivation as a landscape component, and 3) assess pineapple expansion's effects on forest ecosystems and on the potential contributions of the agricultural matrix to biodiversity conservation. We conclude by exploring the policy implications of our integrated findings.

2. Theory

2.1. Integrating political ecology and landscape ecology

Political ecology (PE) aims to understand how access, control and use of natural resources shape global environmental change within the context of a larger political economy (Blaikie and Brookfield, 1987; Turner and Robbins, 2008; Peet et al., 2011). From this perspective natural resource access, use, and control cannot be understood without critically examining how land, labor, and financial resources are distributed in a given period and location. We

draw from PE by utilizing stakeholder testimony to develop a qualitative chain of explanation to link sociopolitical drivers of change to local environmental and social outcomes (Robbins, 2004; Turner and Robbins, 2008).

The field of landscape ecology integrates methods from ecology and geography to address questions about the effect of landscape patterns on ecological processes (Turner, 2005). One focus of LE is determining how the composition and spatial configuration of land cover types affect the amount of biodiversity the landscape can support (Fahrig et al., 2011; Wu, 2013). Previous studies indicate that some agricultural land use types are frequently used by native species for foraging, breeding, or simply as stepping stones to reach the next habitat patches (Kupfer et al., 2006; Fischer and Lindenmayer, 2007; Harvey and Villalobos, 2007; Chazdon et al., 2009a; Gilbert-Norton et al., 2010; Vilchez et al., 2014). Landscapes that are more heterogeneous, both in composition and configuration, are more likely to include these land use types, and therefore more likely to provide habitat and habitat connectivity for a variety of species than more homogenous landscapes (Daily et al., 2003; Fischer and Lindenmayer, 2007; Milder et al., 2010; Fahrig et al., 2011).

Combined, PE and LE offer a holistic understanding of human-modified landscapes and link ecology to the social and political implications of environmental change. A PE perspective demonstrates how political, economic, and social dynamics operating across multiple scales produce spatially explicit social and environmental change. The LE analysis quantifies the extent and ecological implications of that environmental change across the landscape. PE and LE thus inform each other and illuminate novel opportunities for sustainable agricultural production and biodiversity conservation in agricultural frontiers.

3. Materials and Methods

3.1. Study region

The study region (616,615 ha), was delimited by available remote sensing imagery and the Nicaraguan border (Fig. 1). It includes the landscapes within (245,008 ha) and surrounding the San Juan-La Selva (SJLS) biological corridor in northeastern Costa Rica (centered at 10.61°N, 84.13°W, Fig. 1). This region has a mean annual temperature of 26.5°C and annual precipitation ranging from 3000 - 4500 mm (Grieve et al., 1990; McDade et al., 1994), and lies within a wet tropical forest life zone (*sensu* Holdridge et al., 1975). Old- and second-

growth forest remnants currently cover an important proportion of the land area (Morse et al., 2009; Fagan et al., 2013; Section 4 in this paper), retaining high tree species diversity and showing quick regeneration rates (Guariguata et al., 1997; Schedlbauer et al., 2007; Chazdon et al., 2009b; Norden et al., 2009; Sesnie et al., 2009; Bouroncle and Finegan, 2011). Soil types are generally acidic (pH ~4.5), primarily Inceptisols and Ultisols (Sollins et al., 1994). The terrain is composed of low hills and mountain slopes that range from 0-2,696 m in elevation with steep ravines in upper elevation areas, most of the area are lowlands alluvial terraces and flood plains that range from 0-400 m in elevation (Sesnie et al., 2009). These soil types and the lowland terrain provide are well suited for the cultivation of crops, like pineapple, that require well-drained acidic soils. The most common pineapple variety planted in the SJLS region, MD2, grows well in soils with 4.5 to 5.5 pH and slopes < 15% (Barrientos and Porras, 2010).

The land use and land cover change history in the SJLS region reflects a recent pattern in the tropics where intensive agriculture followed initial human colonization and associated deforestation (Lambin et al., 2003). The opening of the SJLS region in the 1970s and 1980s drove massive deforestation; redistributive land reform led to the eventual dominance of smallholder farms and pasturelands (Butterfield, 1994; Schelhas and Sánchez-Azofeifa, 2006). In the late 1980s, the policies driving this land rush officially ended, replaced by policies simultaneously encouraging forest conservation and NTAE expansion (Schelhas and Sánchez-Azofeifa, 2006).

One of these policies, the 1996 Forestry Law of Costa Rica, instituted a national ban on primary forest clearing; this theoretically “froze” remaining forest patches on the landscape (Watson et al., 1998; Morse et al., 2009). The Law also established an incentive system of payments for ecosystem services to encourage landowners to protect primary forest, allow forest regeneration and plant trees (Evans, 1999). To further protect the remaining forest in the region, a political action committee established the SJLS biological corridor initiative in 2001. The boundaries of the 246,608 ha corridor were delimited to include areas that retained significant primary forest cover and spanned the gap between Indio Maíz Biological Reserve in Nicaragua and Braulio Carrillo National Park in Costa Rica. Together, these protected areas and the SJLS biological corridor form an important link in the larger Mesoamerican Biological Corridor, an initiative begun in 1997 to facilitate regional

ecological connectivity from Mexico to Panama while also promoting sustainable development and improving Mesoamericans' quality of life (IEG, 2011).

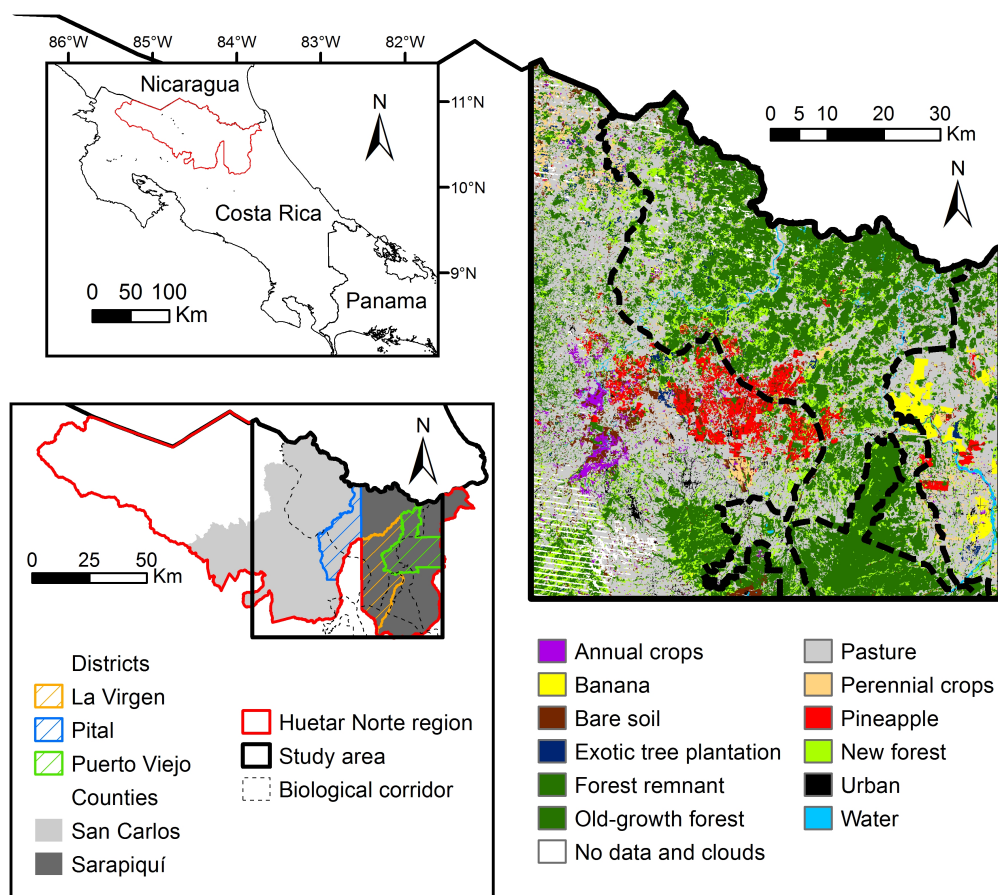


Fig. 1. The San Juan-La Selva biological corridor and surrounding areas are located in northeastern Costa Rica. High resolution Rapid Eye imagery from 2011 was used to identify 12 major land cover types. New forest land cover type includes secondary growth and native tree plantations.

The primary policy change driving NTAE expansion during the same time period was Costa Rica's participation in Structural Adjustment Programs (SAPs). During SAP reforms Costa Rica restructured its agricultural policies away from protectionist, state-supported production of smallholder food crops toward a liberalized, globalized model promoting NTAE production and direct foreign investment (Edelman, 1999). SAPs drove global expansion of NTAEs like pineapple, citrus, and melon (Thrupp, 1995; Vagernon et al., 2009),

and the decline of in-country production of food crops (Edelman, 1999). Pineapple expansion influenced social and demographic changes in communities of the SJLS region. Employment opportunities at pineapple plantations drew migrants from both Costa Rica and Nicaragua. As a result, Sarapiquí County, which covers most of the SJLS biological corridor (Fig. 1), has the fourth highest population of Nicaraguan immigrants in Costa Rica and the second highest population growth rate of all counties in Costa Rica (INEC, 2011). The growth of economic opportunities has led to some gains in economic welfare, such as increased television and car ownership (Table 1). However, farm ownership has not increased proportional to the population increase; most recent migrants to the region remain landless.

Table 1. Basic indicators of economic welfare, population composition, and population size in districts that cover the area of the SJLS biological corridor, 1984 and 2011.*

| Districts | 1984 | | | 2011 | | |
|-----------------------------|--------------|-----------|-------|--------------|-----------|--------|
| | Puerto Viejo | La Virgen | Pital | Puerto Viejo | La Virgen | Pital |
| Television Ownership | 19 | 8 | 75 | 4,469 | 2,676 | 3,823 |
| Car Ownership | 11 | 20 | 51 | 871 | 727 | 1,159 |
| Farm Ownership | 336 | 456 | 513 | 442 | 345 | 646 |
| Cooks with Wood or Charcoal | 607 | 822 | 1,015 | 455 | 417 | 348 |
| Nicaraguan Immigrants | 341 | 193 | 181 | 5,249 | 1,701 | 4,114 |
| Population (Total) | 4,107 | 4,451 | 6,614 | 20,174 | 10,706 | 17,325 |

*All values are numbers of individuals. Puerto Viejo and La Virgen are in Sarapiquí County, while Pital is in San Carlos County. These 3 districts cover most of the area of the SJLS Biological Corridor (see Fig. 1). CCP Census Data (<http://ccp.ucr.ac.cr/>) are presented as number of individuals.

The study region is a critical conservation area that has thus far succeeded in maintaining relatively high forest cover and resilient forest dynamics despite population growth and a modernizing agricultural landscape (Letcher and Chazdon, 2009; Norden et al., 2009; Schedlbauer et al., 2007; Bouroncle and Finegan, 2011; Fagan et al., 2013). These factors make the SJLS region ideal for studying the effects of NTAE-based agricultural intensification on rural economies and biodiversity conservation, and for exploring the tradeoffs between parallel agricultural growth and conservation objectives.

3.2. *Political ecology analysis*

From September 2011 to May 2013 we conducted thirty-five semi-structured interviews applying the comprehensive approach (Kaufmann, 2011; Sibelet et al., 2013). Participants in our sample were selected to include a wide range of individuals and organizations involved in land use decisions and policy in the study region, including farmers' organizations, large landholders, conservation organizations and regional and national agricultural government officials. Interviews lasted 1-2 hours and were conducted in both Spanish and English. Large landholders were purposively sampled across the study region and represented the range of land cover types in the SJLS biological corridor, from forested tourism reserves to pineapple plantations. All interviewees were asked to describe the factors and policies that influence land use or their business operation decisions in particular, to describe the scale and operation of their farming system or business, and to reflect on social-environmental change in this region. The interviews were digitally voice-recorded, fully transcribed and then coded in ATLAS Ti for themes drawn from PE related to land, labor and financial resource distribution, and perceptions of agricultural and environmental change and vulnerability. In addition to the interviews, we reviewed census data, peer-reviewed publications, and gray literature in both Spanish and English. Where district-level (Puerto Viejo, La Virgen and Pital) data were not available, county level data were used (San Carlos and Sarapiquí counties, Fig. 1). Where county-level data were unavailable, data were derived from analyses of the entire Huetar Norte region, which includes San Carlos and Sarapiquí counties as well as the counties of Guatuso, Los Chiles and Upala (Fig. 1).

3.3. *Landscape ecology analysis*

Several historical land cover maps are available for the SJLS region (Sánchez et al. 2001, Morse et al. 2009, Fagan et al. 2013). Recently, Fagan et al. (2013) used Landsat (30 m) imagery to produce land cover maps for 1986, 1996, 2001, 2005, and 2011. In this study we used 2011 RapidEye multispectral satellite imagery (5 m) and extensive ground truth points to produce the most high-resolution land cover map to date of the region.

Low cloud-cover RapidEye images were chosen from a 2010-2011 library of images. For each image, we calculated ten spectral indices based on the red edge band (Schuster et al., 2011) and a texture band based on a 7x7 pixel window from the Normalized Difference Red

Edge Index (Appendix A). All layers were stacked to obtain a 17-band image, which was then classified in ENVI 4.7 (Exelis, Inc., McLean, VA, USA) using a support vector machine classification algorithm. Training data were obtained from 3,000 ground truth points gathered from sources across the region in 2010-2011. We classified 12 dominant land cover types (Fig. 1). *Old-growth forests* represents forest that for the past 100 years has not been clear cut or impacted by a major human intervention; although this forest may have been impacted by selective logging, understory clearing or hunting, the composition and structure is not distinctive from original primary forest characterized by the dominance of native tree species, and the presence of canopy emergent trees, canopy palms, lianas and native understory species. *Forest remnants* corresponds to forest patches with similar spectral characteristics as old-growth forest but that are smaller than 2 ha in total size. *New forests* include both secondary growth, including all stages of natural regeneration, and native tree plantations. *Exotic tree plantations* mainly include species such as *Tectona grandis* and *Melina arborea*. Agricultural land cover types are *pasture*, *banana*, *pineapple*, *perennial crops* (e.g., heart of palm, black pepper) and *annual crops* (e.g., maize). *Urban areas*, *water*, and *bare soil* are the remaining land cover types. Several forest classes exhibited spectral overlap, so to improve our classification we first classified all forest within the RapidEye images into a single category, and then subdivided this category into distinct forest types from the Landsat -based map developed by Fagan et al. (2013). Overall accuracy for the 2011 land cover maps is 94% with different values for each land cover category (Appendix B). Accuracy was assessed using an independent set of 513 ground truth points gathered in 2011, this data set was not used for image classification purposes.

To assess landscape composition and measure the effects of agricultural land uses on forest fragmentation, we selected a set of metrics related to area, contrast and aggregation available in the FRAGSTATS spatial statistics program (V.4.2, University of Massachusetts, Amherst, Massachusetts, USA) (Appendix C, Table C1.). Metrics were selected based on their universality and consistency as independent components of landscape structure at the class and landscape level as identified by Cushman et al. (2008) and McGarigal et al. (2012). We then calculated all metrics within and outside the biological corridor separately (Fig. 1). More detailed information on the FRAGSTATS analysis is given in Appendix C.

Additionally, we conducted an analysis in Arc Map 10.1 (ESRI 2011) to compare the amount of fine-scale landscape elements such as single trees, live fences, and riparian corridors, that are present in pineapple plantations versus other agricultural land cover types. These fine-scale habitat features are not possible to identify using lower-resolution (30 m Landsat) imagery; the availability of high-resolution (5 m RapidEye) maps provides a unique opportunity to assess the contributions of these fine-scale features to forest connectivity and to determine which land cover types are most likely to retain these features (Boyle et al., 2014). To quantify the fine-scale landscape features in each land cover type in the SJLS region, we used a tree cover map based on 5 m RapidEye and the zonal statistics tool in ArcMap 10.1. Considering single trees and groups of trees with a size < 0.5 ha, we calculated the mean percentage area covered by trees for each individual land cover type: pineapple, annual crops, perennial crops, banana and pasture.

To understand the potential growth boundaries of pineapple, we calculated the percentage of the SJLS biological corridor and surrounding landscape that is suitable for its cultivation. We used the following criteria to identify optimal land for pineapple cultivation: a) slope of less than 15%, b) characterized by Inceptisol or Histosol soils, and c) occurring within 3 km of a well-developed (i.e. paved or well-maintained dirt) road (Enríquez, 1994; Pitácuar, 2010). Slope was calculated with a DEM layer of the SJLS derived from the work of Sesnie et al. (2009), and soil type and distance from well-developed road was calculated using layers from the Atlas of Costa Rica (ITCR, 2008).

4. Results and Discussion

Our findings link spatial patterns of land use in the study region to historical and current economic policy, and reveal unexpected impacts of pineapple expansion on both social and ecological systems. Our LE analyses indicate that the study region (Fig. 1) is dominated by pasturelands (39%), old-growth forest (34%) and new forest (9.1%) (Table 2). Pineapple plantations and patches of bare soil (likely including land in preparation for agricultural uses) respectively cover 3.6% and 2.9% of the landscape. The rest of the landscape is occupied by other types of agricultural lands, tree plantations, urban areas and small (< 2 ha) patches of remnant forest; each of these land cover types represents between 2.1% and 0.72% of the landscape (Table 2).

Table 2. FRAGSTATS analysis results summarizing area and subdivision metrics for all land cover classes in the San Juan-La Selva region. Metric units are given in parenthesis, and a detailed definition of each metric is available in Appendix C, Table C1. Land cover categories are listed from highest to lowest according to their total area in the landscape.

| Land cover type | Area | | | Subdivision | | Isolation | | |
|------------------------|------------|------------------|------------|------------------|------------|-----------|------------|------------|
| | CA (ha) | PLAN D (%) | LPI (%) | ARE A (ha) | SPLIT | NP | PROX | ENN (m) |
| Pasture | 244,959 | 39.7 | 12.3 | 57 | 45 | 4,299 | 337,372.10 | 84 |
| Old-growth forest | 210,022 | 34.0 | 6.7 | 50 | 105 | 4,185 | 28,891.80 | 120.9 |
| New forest* | 56,448 | 9.1 | 0.1 | 6 | 160,503 | 10,120 | 113.4 | 141.6 |
| Pineapple | 22,139 | 3.6 | 0.9 | 33 | 7,017 | 672 | 25,759.70 | 241.9 |
| Bare soil | 17,968 | 2.9 | 0.1 | 6 | 248,864 | 3,290 | 127.5 | 273 |
| Perennial crop | 13,259 | 2.1 | 0.1 | 6 | 337,451 | 2,291 | 259.6 | 238.7 |
| Banana | 8,919 | 1.4 | 0.6 | 29 | 21,397 | 312 | 1,571.60 | 968.2 |
| Annual crop | 7,815 | 1.3 | 0.1 | 5 | 268,389 | 1,462 | 625.7 | 379.2 |
| Exotic tree plantation | 6,609 | 1.1 | 0.04 | 4 | 1,551,421 | 1,528 | 43.4 | 455.8 |
| Urban | 4,565 | 0.7 | 0.1 | 5 | 1,298,114 | 980 | 246 | 329.3 |
| Forest remnant | 4,424 | 0.7 | 0.001 | 1 | 56,602,757 | 3,088 | 5.5 | 429.3 |

CA: Total area, PLAND: percentage of landscape, LPI: Largest Patch Index, AREA: Mean patch size, SPLIT: Splitting Index, NP: Number of Patches, PROX: Proximity Index, ENN: Mean Euclidean Nearest-Neighbor Distance. *This land cover type includes secondary growth and native tree plantations.

4.1. Pineapple expansion and intensification as a social, economic and ecological process

As illustrated in Fig. 2, pineapple was almost non-existent in the landscape in 1986, around the time of the SAP reforms, but increased markedly by 1996 and showed the greatest expansion from 2001-2011. This pattern of expansion was not limited to the SJLS region; from 2006 to 2010 the land area across Costa Rica used for pineapple cultivation doubled from 22,400 ha to 45,000 ha while the crop export value increased 55% (Barquero, 2011). By

2011, pineapple had become the second most important agricultural export for Costa Rica (worth \$666 million in 2010) and had created 27,000 direct jobs and 110,000 indirect jobs in production, harvesting, and processing (Barquero, 2011). Nearly 50% (22,138.9 ha) of the total national land area in pineapple lies within our study region. Fagan et al. (2013) found that pineapple production in the SJLS from 2001-2011 was largely not replacing old-growth forest, but was instead expanding primarily into lands previously used for pasture or annual and perennial crops.

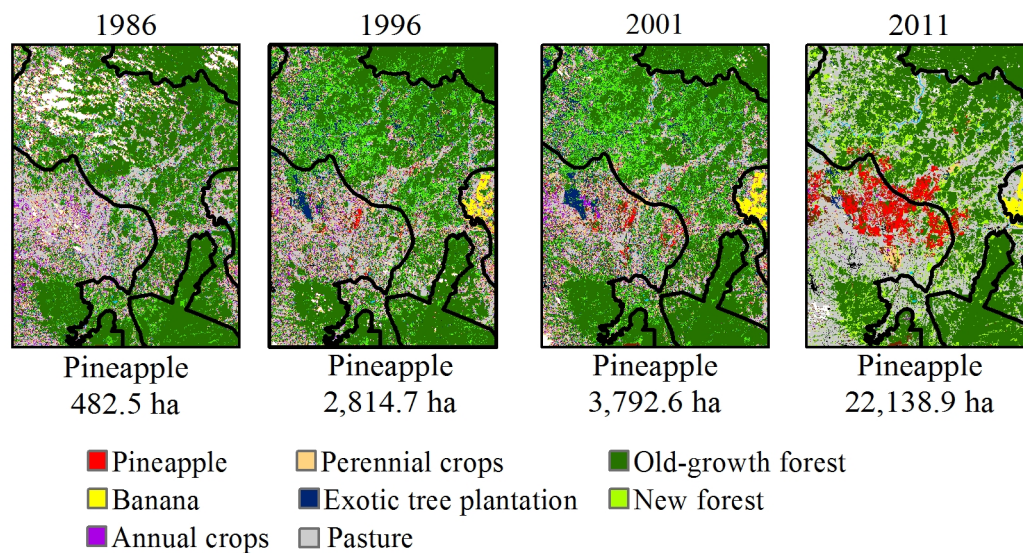


Fig. 2. The expansion of pineapple in the San Juan-La Selva biological corridor and surrounding landscape, 1986-2011. The 1986, 1996, and 2001 maps are from Morse et al. (2009), and the 2011 map was produced for the current study. New forest land cover type includes secondary growth and native tree plantations.

In the SJLS region, pineapple plantations currently occupy a higher percentage of total land than traditional agricultural production systems including annual and perennial crops (Table 2). Although pineapple plantations cover less than 4% of the total study region, they usually occupy large patches, second in size only to pasture and forest patches. Of total land dedicated to pineapple plantations in the study region, 78% occurs outside the SJLS biological corridor and 22% lies within (Table 3). Outside the corridor, pineapple patches are 10 ha larger on average and more aggregated than those found within. Pineapple's more aggregated

spatial configuration relative to other crops illustrates how pineapple homogenizes the agricultural matrix, converting smaller farm parcels into large-scale pineapple plantations.

Table 3. Comparison of area, subdivision, isolation and contrast metrics for dominant land cover type both within (245,008 ha) and outside (371,607 ha) of the San Juan-La Selva biological corridor. Metrics units are given in parenthesis. Core area and contrast metrics are given only for old-growth forest.

| | Metric | Old-growth forest | New forest* | Pasture | Pineapple |
|---------|-----------|-------------------|-------------|---------|-----------|
| Within | PLAND (%) | 47.2 | 11.3 | 32.0 | 2.0 |
| | LPI (%) | 13.7 | 0.1 | 3.0 | 0.9 |
| | AREA (ha) | 76 | 6 | 37 | 26 |
| | SPLIT | 33 | 44,863 | 269 | 9,892 |
| | PROX | 47,516 | 129 | 22,451 | 9,659 |
| | ENN (m) | 94 | 123 | 87 | 407 |
| | CORE (ha) | 62 | | | |
| | TECI (%) | 57 | | | |
| Outside | PLAND (%) | 25.3 | 7.7 | 44.7 | 4.6 |
| | LPI (%) | 7.6 | 0.1 | 13.3 | 1.1 |
| | AREA (ha) | 30 | 5 | 59 | 33 |
| | SPLIT | 146 | 142,119 | 36 | 4,552 |
| | PROX | 10,596 | 92 | 253,769 | 20,329 |
| | ENN (m) | 128 | 156 | 80 | 197 |
| | CORE (ha) | 22 | | | |
| | TECI (%) | 63 | | | |

AREA: Mean patch size, CORE: Mean core area per patch, ENN: Mean Euclidean Nearest-Neighbor Distance, LPI: Largest Patch Index, PLAND: percentage of landscape, PROX: Mean Proximity Index, TECI: total edge contrast index: mean edge contrast index, SPLIT: Splitting Index. *This land cover type includes secondary growth and native tree plantations.

Our pineapple suitability analysis suggests this trend of homogenization is likely to spread across more of the landscape, especially if road development continues at its current pace. We found that in the entire study region, 26.2% of the land is highly suitable for pineapple cultivation and an additional 15.7% is moderately suitable (Fig. 3). Considering only land within the corridor, currently 2% is under pineapple cultivation (Table 4). However, 17.1% is highly suitable for future pineapple cultivation and an additional 16.6% is

moderately suitable. Both our pineapple suitability analysis and current economic trends (Fold and Gough, 2008; Vagneron et al., 2009) suggest future pineapple production will likely expand both within and outside of the corridor.

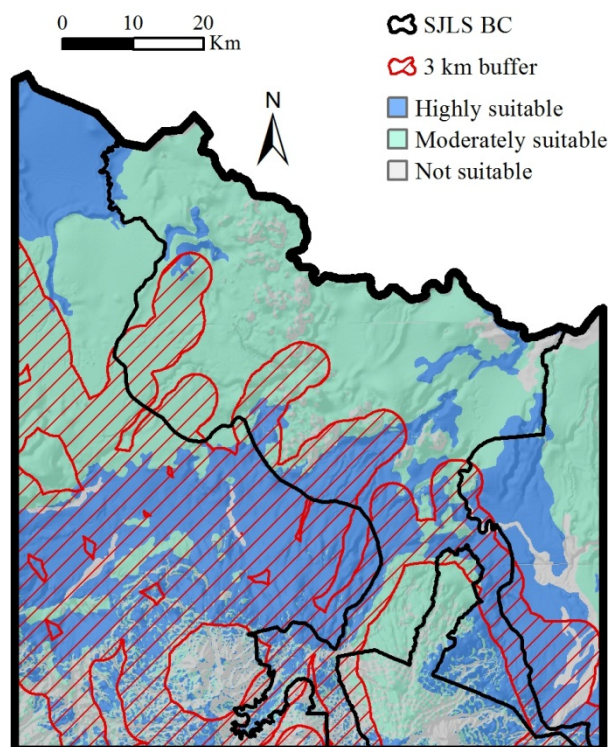


Fig. 3. Pineapple suitability analysis. Suitable areas for pineapple cultivation were identified according to soil type and slope. Because the probability of pineapple cultivation increases with accessibility to roads, a 3 km buffer (red hatch) around principal roads is also shown.

Besides changing the composition and configuration of land cover types, pineapple is also driving a social economic shift within the agricultural sector away from smallholder crops and toward intensive, large-scale, agribusiness-dominated production systems (Table 4). The NTAE sector's social and economic organization is related to cost advantages associated with larger scale operations that favor agribusinesses (Table 4). For example, in the Huetar Norte region, the average investment to begin planting pineapple is \$9,900/ha (Villegas et al., 2007). In an area where the median monthly income of agricultural households is \$625, this investment capital requirement is prohibitive for most households (Progama Estado de la Nación, 2010). When the last pineapple census was conducted in 2004, pineapple farms in the

Huetar Norte region with less than 10 ha accounted for only 12.9% of the land in pineapple production, while farms larger than 100 ha accounted for 76.8% (MAG census, 2005). These large farms range in size from 200-1,200 ha, with an average of 492 ha under cultivation (Villegas et al., 2007). In our FRAGSTATS analysis (Table 3), the largest patch of pineapple outside the SJLS biological corridor was 5,466 ha and the largest within the corridor was 2,308 ha; this suggests individual pineapple plantations are large and tend to border each other to form contiguous mega-patches of pineapple across the landscape.

Table 4. Comparison of different production system variables demonstrating that intensification occurs across multiple components of a production system and shifts the socio-economic organization of agricultural production.*

| Component of the production system | Smallholder farm | Extensive cattle ranch | Agribusiness pineapple plantation |
|---|--|--|---|
| Labor type | Family labor | Family and hired labor: 1 person/100 cows | Hired labor: 1 person for every 2 ha. |
| Cost of production | Varies | Low | High (average \$9,900/ha for international export) up to \$22,000/ha for organic production |
| Use of inputs (fertilizers, pesticides) | Varies | Low | High (average of 20 kg/ha); uses machinery |
| Land cover type | Diversified, often including subsistence food crops | Pasture, sometimes with remnant trees and live fences Density: > 1 cow/ha. | Monoculture Density: 72,000 plants/ha |
| Average size | 3-6 ha | 35 ha | 492 ha |
| Market destination | Sold at national farmers' markets, to packing plants or to intermediaries at farm gate | Sold at regional auctions for international export or for national consumption | Exported internationally to major supermarket chains via direct contracts |
| Principal reason for land use | Low investment, easy to locate market, low technical/labor requirements. | Guaranteed market, low labor requirements, culture | Price, international demand |

*Interviews 2011-2013. Smallholder data: Saenz-Segura et al. (2007); MAG (2005). Pineapple data: FAO (2007). Cattle data: Hollman (2008). All data is for the Huetar Norte region (see Fig. 1).

The high cost of labor and agrochemicals also favors large-scale plantations over small farms. The pineapple variety MD2 is densely planted, and the proportion of labor done by hand requires a large, year round labor force. Conventional pineapple cultivation relies on high agrochemical inputs (Table 4), an expense most small farmers cannot afford (Piñero and Díaz Ríos, 2007). Large agribusiness is vertically integrated in this sector (i.e., it dominates all stages of production and market distribution) (Lee et al., 2013), and most smaller agribusinesses fulfill contracts for a larger company, typically Dole or Del Monte, who together control 85% of all pineapple exported from Costa Rica (Vagneron et al., 2009; Blacio et al., 2010; Amanor, 2012).

Local government officials in the SJLS biological corridor are aware of how large agribusinesses dominate pineapple production and of how untenable pineapple is as a primary rural development strategy for small farmers. A Ministry of Agriculture representative remarked, “With MD2, there was an explosion of big producers...small and medium farmers also got involved who were in other crops, were in livestock, tubers or palm and they got into pineapple. Why? Because in 2003-2008, it was profitable. There were good prices, costs were good, but with the 2008 crisis which erupted in the U.S.... followed [by] Europe in the years 2010-2012...we were in a bad situation, and people moved away from the activity, especially smallholders.”

Several times interviewees described land conversion to pineapple as a dual process of concentrating land and reducing smallholder land ownership. A prominent farmer and rancher’s organization leader explained “Many farmers who produced not only cattle but also tubers, very few of them changed their activities to grow pineapple because those that had 50 hectares or less -in pineapple that is very little-, so many of them sold their land to [pineapple] companies and have left the activity [farming].” For example, one of the larger pineapple plantations in the region covers 1,500 ha, 43% of which is rented land from neighboring farms. This trend of ‘land grabbing’ has been documented in pineapple in Ghana (Amanor, 2012) as well as for other NTAEs like oil palm in southern Costa Rica (Piñero and Díaz Ríos, 2007). Although, this may provide immediate rent-based income for smallholders or income in the short term from the sale of their land, often small farmers struggle to transfer into another profession due to low education and professional experience. These losses of control either in land use decision-making or in land ownership are often detrimental in the long term

as they foster insecurity in the rural poor through dependency on agribusinesses and commodity booms that are typically temporary and unsustainable ecologically and economically (Amanor, 2012).

In reflecting on the social and environmental change caused by the expansion of pineapple, different stakeholders have distinct interpretations of how pineapple expansion plays into the larger vision of rural development. Stakeholders interested in sustainable development for both local farmers and local biodiversity often expressed concern about the economic and ecological vulnerability to pineapple expansion. As one representative of the SJLS biological corridor initiative said “I have a very encompassing vision of sustainability and I see that the pineapple scheme is not what is going to make the country advance in the theme of sustainable development or for the local people. We are betting on an export product that in any given moment the market changes, at an international level, the next day it is going to be Philippines or Ecuador or Hawaii... If the prices fall, the farmers here will be left in complete ruin because they are not owners of their farms, many times they sell or rent, lose control of the production, they lose control of their land and they all have big loans for machines, fertilizers and costly technology packages. It is a very big risk and for [forest] connectivity it is fatal.”

In contrast, a pineapple company manager saw this expansion increasing employment and therefore development in an economically marginalized region. He explained, “Always, this type of company [agribusiness] brings development. For example, with 400 ha someone can handle more or less 300 cows. To handle 300 cows, they have to employ about three people. Pineapple needs one person per half hectare. That is to say, yes it brings development.” One of the largest forest landowners in the region reiterated this idea that pineapple companies develop the region and facilitate economic growth: “the town was here, but it was a very small town. There was no economic activity to speak of, I mean, a lot of people were just living off their land...when these pineapple guys came here, they improved a lot of stuff. They had the money to improve roads, they had the money to talk to politicians and bring infrastructure in here, I mean, you see now in this area, a lot of nice pick-ups driving around-- those are people that sold land for a good price here, so a lot of stuff has changed here.” These diverging descriptions demonstrate that people living and working in

this landscape have conflicting ideas about a desirable path to development in this region and the long and short-term benefits of pineapple.

On a global scale, large agribusiness prevalence and smallholder exclusion do not always characterize NTAE crop production. For example, prior to 2000, the majority of the fresh pineapple imported to the European Union (E.U.) came from West African countries, where smallholder production and smallholder integration into the value chain predominated (Fold and Gough, 2008). The primary reason pineapple production in Costa Rica has not followed a similar pattern is Del Monte's dominance in its market, which until 2003 held the exclusive patent to the MD2 pineapple variety. This monopoly excluded initial smallholder participation in the production boom and consolidated the pineapple value chain into the hands of large agribusinesses (Fold and Gough, 2008). MD2's recent introduction in Ghana is driving a shift from smallholder to agribusiness production systems, resulting in growth in land ownership concentration, agricultural wage labor dependence for livelihoods, and prohibitive production costs for smallholders (Fold and Gough, 2008; Amanor, 2012). As these aspects of the 'Costa Rican' model of pineapple production continue to be replicated globally in other NTAE crops, other regions may also experience similar changes to socio-economic characteristics and landscape composition.

4.2. Impacts of pineapple expansion on forest and future biodiversity conservation in the agricultural matrix

Given the proportion of original forest cover remaining, the study landscape can be categorized as fragmented (Table 2; McIntyre and Hobbs, 1999). However, results from FRAGSTATS analysis indicate the remaining old-growth forest is not highly subdivided, as the aggregation metrics SPLIT, PROX, ENN and LPI show (Table 3); the largest old-growth forest patch covers almost 7% of the total study region (Table 2). In accordance with the original criteria selected to establish the SJLS biological corridor, our results show that more than half of the total old-growth forest cover is located within the corridor limits, and in contrast to the landscape outside the SJLS, forest remnants within the corridor are considerably larger and less isolated (Table 3).

These results confirm the findings of Morse et al. (2009) and Fagan et al. (2013) that showed the 1996 Forestry Law and the system of payment for ecosystem services have been

successful in promoting conservation of old-growth forest in this landscape. The matrix between these forest patches continues to change, though, and the assessment of how these changes affect remaining forest should become a priority.

Previous studies document that forest directly adjacent to agricultural land uses suffers from “edge effects”, which drive changes in forest microclimate, tree mortality, and in the abundance and distribution of animal species; the severity of edge effects vary depending on the type of adjacent land use (Fischer and Lindenmayer, 2007; Schedlbauer et al., 2007; Bouroncle and Finegan, 2011; Laurance et al. 2011). FRAGSTATS metrics such as core area (CORE), which describes the patch area free of edge effects, and edge contrast indices (TECI), which describe the proportion of forest edge in maximum contrast (Table A1), are useful metrics for assessing the impact of edge effects. TECI is based on the dissimilarity in vegetation structure between two adjacent land cover types; for example, new forest and old-growth forest would have low contrast values, whereas pineapple and old-growth forest would have high contrast values. When higher contrast land covers, such as bare soil, pineapple, or pasture are adjacent to forest, it reduces the core area of the forest patch that is free of edge effects (CORE) (Table 3). In the SJLS biological corridor there is a high incidence of old-growth forest patches that border high contrast land covers like pasture or pineapple and are thus vulnerable to strong edge effects (Table 3).

Euclidian distance to the nearest patch of the same type (ENN) and the proximity index metric (PROX) are also useful for assessing how old-growth forest patches are affected by the agricultural matrix (Table 5). A low value of the proximity metric indicates that the patch is more isolated and has more forest fragmentation in its surroundings (Whitcomb et al., 1981). Our results reveal that old-growth forest patches sharing a border with pineapple have higher ENN values and lower PROX values than similar patches bordered by pasture (Table 5), meaning that the patches surrounded by pineapple are dramatically more isolated. Interestingly, old-growth forest patches that share a boundary with pineapple have a larger mean area than those surrounded by pasture (Table 5). This is due to differences in production strategies between pasture and pineapple. Pastures often retain small old-growth forest patches, groups of trees, and riparian areas, which serve to provide water and shade for livestock. In contrast, pineapple plantations seek to maximize continuous planted area, and therefore retain the old-growth forest patches protected by law but eliminate single trees or

groups of trees within the production area, which can be important for connectivity. The isolating effect of pineapple on forest patches is a concern that conservation interests in the corridor identified. One reserve owner noted, “We have a small [forested] area that depends on the larger [protected] areas to have a diversity of organisms...we want to generate connectivity so that we do not become converted into an island surrounded by pineapple.”

Table 5. Mean patch area and isolation metrics for forested land cover classes.

| | All patches | | | Share boundary with pasture (n=3,559) | | | Share boundary with pineapple (n = 402) | | |
|-------------------|-------------|--------|---------|---------------------------------------|--------|---------|---|-------|---------|
| | AREA (ha) | PROX | ENN (m) | AREA (ha) | PROX | ENN (m) | AREA (ha) | PROX | ENN (m) |
| Old-growth forest | 57 | 28,892 | 121 | 29 | 31,459 | 115 | 44 | 3,202 | 176 |
| New forest* | | 113 | 142 | | | | | | |
| Forest remnant | | 6 | 429 | | | | | | |

* This land cover type includes secondary growth and native tree plantations. AREA: Mean patch size, PROX: Proximity Index, ENN: Mean Euclidean Nearest-Neighbor Distance.

Although the new forests land cover type occupies more than 55,000 ha in the landscape, the high number of patches (NP) of small mean size (AREA) with low mean proximity values (PROX) to other similar patches indicates that this type of vegetation cover is subdivided and isolated (Tables 2, 3). The new forest land cover type is equally distributed outside and within the SJLS biological corridor, but within the corridor, patches are less subdivided and represent a higher percentage of the total land area (Table 3). Within this land cover type, later stages of secondary growth are known to have similar vegetation structure to old-growth forest, and therefore may provide habitat for native species (Fischer et al., 2006). Using high-resolution imagery allowed us to detect small (< 2 ha) old-growth and new forest patches not detected in previous studies using Landsat imagery (Fagan et al., 2013). These small forest patches grouped within the forest remnant land cover type represent a very low percentage of the landscape, but potentially serve as stepping-stones to enhance forest connectivity (Harvey et al., 2005; Hanson et al., 2007). For example, Hanson et al. (2008) found long-distance gene flow can be maintained among separated populations of canopy tree species through the connectivity stepping-stones of isolated trees or small forest patches provide.

Results of our analysis of fine-scale landscape features indicate that, among all land covers types analyzed, pineapple has the lowest percentage of tree cover per unit area, with the exception of banana plantations (Fig. 4). The greatest differences in tree cover were observed between pineapple and perennial crops, such as heart of palm or fruit trees and pasture, which have twice the percentage of tree cover than pineapple plantations. Another important difference between in pineapple versus pasture or perennial crops is the spatial distribution of tree cover. In pasture and crops, single trees and small groups of trees are retained within the land use rather than just at the edges, as in pineapple (Fig. 4). A pineapple producer explained the practice of maintaining only legally mandated tree cover within the plantations. There is a river that cuts across the plantation, and as he said, “I have to leave 60 meters or 30 meters on each side [of the river] and that makes lot[s] of hectares. Over there there is a spring and with a spring you have to leave 1,000 meters around it. So that’s how they form patches of forest. There are patches all over but when you combine them it’s a lot of forested land.” The practice of retaining forest cover only along riparian corridors is evident in Fig. 4, where it can be seen that trees in pineapple plantations (a) are confined to depressions or river corridors within the plots, leaving most of the plantation void of tree cover. In contrast, trees in pasture (b) are usually dispersed across a large area, creating patches of low and high tree density and maintaining heterogeneity within the land use.

| Land Use | % Tree Cover | STD |
|-----------------|--------------|-----|
| Banana | 0.4 | 0.6 |
| Pineapple | 2.1 | 1.1 |
| Annual Crops | 2.7 | 1.6 |
| Perennial Crops | 3.9 | 1.9 |
| Pasture | 4.7 | 2.1 |



Fig. 4. Mean percentage of area covered by fine-scale forest features such as single trees, groups of trees and live fences, in the dominant agricultural land cover categories: (a) Pineapple, (b) Pasture. Pictures correspond to 5 m resolution RapidEye imagery.

Previous studies indicate that land cover types characterized by having either more scattered trees and live fences (Perfecto et al., 2003; Vaughan et al., 2007; Harvey et al., 2008), or vegetation structure that is more similar to natural forest cover (Brotons et al., 2003; DeClerck et al., 2010; Prevedello and Vieira, 2010; Eycott et al., 2012; Vilchez et al., 2014), are more likely to be used by native species for foraging, breeding, or as stepping stones to reach other habitat patches (Kupfer et al., 2006; Fischer and Lindenmayer, 2007; Harvey and Villalobos, 2007; Chazdon et al., 2009a; Gilbert-Norton et al., 2010; Vilchez et al., 2014). The reduced tree cover within pineapple plantations and the pronounced difference in vegetation structure between pineapple and natural forest suggest that pineapple likely reduces habitat availability and connectivity when compared to other land cover types such as pasture or annual and perennial crops.

The SJLS region retains a significant proportion of old-growth forest cover, but our analyses show conversion of smallholder crops and pasturelands to pineapple plantations affects forest cover, leading to loss of total tree cover and of landscape heterogeneity. Furthermore, our pineapple suitability analysis suggests that if road development and favorable market conditions continue, pineapple plantations will further spread into the SJLS biological corridor. These findings emphasize the importance of developing effective policies to mitigate current and future impacts of pineapple expansion on the linked social and ecological systems in the study region.

4.3. Current policy on pineapple at a landscape scale

Policy discussions about the future of pineapple in Costa Rica have been occurring at the national level through the National Pineapple Platform (Plataforma Nacional de Piña - PNP), which is a two-year participatory dialogue hosted by the United Nations Development Program, the Ministry of Agriculture and the Ministry of the Environment. Participants in this dialogue have developed an action plan for 2013-2017 (<http://www.pnp.cr/plan.php>), focusing mostly on actions to improve practices at the farm level. However, according to leaders in the SJLS biological corridor initiative, “There are management standards but they are focused completely on the plantation; there is no vision of the landscape.”

Municipalities are also important players in forming policies to regulate pineapple. They have legal power to develop a territorial land use-zoning plan called a “plan regulador” which can direct where pineapple expands and limit its growth if desired. This plan is the best mechanism municipalities have to effectively partition public and private land and exclude certain land uses or developments, but most rural municipalities do not have current or well-developed plans (Pérez Peláez and Alvarado Salas, 2003). “Sometimes, there are not sufficient resources to do studies, because of this they [municipalities] get behind a bit...so until they do the studies, they cannot determine legally, under their land use zoning plan, what is the zone for this [X] land use,” explained a representative of the National Environmental Technical Secretariat (Secretaría Técnica Nacional Ambiental).

5. Conclusions

Our results reveal how pineapple expansion produces social and environmental change with local conservation implications. In particular, our synthesis of data suggests that pineapple concentrates land, labor, and financial resources on the landscape, thereby increasing the homogeneity of the agricultural economy in the study region. When spatially heterogeneous pastures with tree cover or smallholder farms are converted to monoculture plantations dominated by agribusinesses, the loss of autonomy (i.e., land ownership or land use decision-making) constrains farm-based livelihoods, food security and agricultural diversity. Pineapple production also simplifies and homogenizes the agricultural matrix between forest patches. It further isolates old-growth forest patches, and reduces total tree cover, all of which are critical for maintaining connectivity of remnant forest patches. Since biodiversity in agricultural landscapes is positively associated with percent of tree cover and landscape heterogeneity, the continued spread of pineapple plantations is likely to have a negative effect on biodiversity conservation.

Despite pineapple’s negative influence on some social and ecological components of the landscape, in some ways the SJLS region represents a best-case scenario. Strict and innovative regulatory and incentive schemes have successfully promoted retention of old-growth forest cover, and pineapple is just beginning to dominate agricultural land use. Spatially heterogeneous smallholder production systems and pasture with tree cover are still abundant within the corridor and contribute to forest connectivity.

To protect biodiversity and promote inclusive rural development in the face of pineapple expansion we propose several landscape-level policy and management approaches. First, sustainable production must be incentivized. In the SJLS region there has been unprecedented inter-institutional dialogue and coordination to develop an action plan for sustainable pineapple production and this is a major focus of the PNP action plan. Second, policies that encourage landscape-level planning (Sayer et al., 2012) should be established to promote land use heterogeneity and economic diversity within the agricultural sector. Retaining smallholder agriculture as a viable livelihood should be a priority for both conservation and agricultural policy makers, as smallholders are critical contributors to food security, landscape heterogeneity and crop diversity (Dahlquist et al., 2007; Fisher et al., 2008; Perfecto and Vandemeer, 2008; Tschardt et al., 2012). Third, landscape level planning should follow national level policies such as the Costa Rican 2021 carbon neutrality goal. This goal has already motivated several multinational agribusinesses to establish carbon neutral production strategies (Kilian et al., 2012). Agribusinesses could also commit to retaining more forest cover within plantations or to forest offset programs; this would contribute to their goals of offsetting carbon emissions while also increasing habitat connectivity. However, any investments toward carbon neutrality or sustainable production by agribusinesses need to be matched throughout the value chain by retailers in marketing and setting higher selling prices to offset these investments. Fourth, the Forestry Law of 1996 should be updated to more effectively target conservation and restoration of both riparian and secondary forest to promote both increased habitat connectivity (Fremier et al., 2013) and move Costa Rica closer to its goal of carbon neutrality. Current conservation regulations in Costa Rica protect old-growth forest, while creating perverse incentives that block regrowth of secondary forest (Sierra and Russman, 2006; Morse et al., 2009; Fagan et al., 2013) despite evidence that secondary forests contribute to carbon sequestration (Pan et al., 2011).

Due to the global relevance of balancing local economic growth with biodiversity conservation, this Costa Rican case study can serve as a model against which to compare other regions currently undergoing rapid expansion of NTAE crop production. Indeed, understanding the social-ecological impacts of agricultural intensification in tropical regions is a critical piece of promoting the sustainability of rural agrarian development around the world. As shown in this study, landscapes operate as integrated social- ecological systems,

and must be managed holistically to retain spatially and economically diverse land uses that support sustainable rural livelihoods and create a balance between agricultural production and biodiversity conservation.

References

- Amanor, K.S., 2012. Global resource grabs, agribusiness concentration and the smallholder: two West African case studies. *Journal of Peasant Studies* 39, 731-749.
- Barquero, M., 2011. Costa Rica se mantiene como el mayor exportador mundial de piña. *La Nación* December 21 (http://www.nacion.com/economia/Costa-Rica-mantiene-exportador-mundial_0_1239476064.html).
- Barrientos, O., Porras, S., 2010. Sector agropecuario cadena producción de piña. Políticas y acciones. Secretaría Ejecutiva de Planificación Sectoral Agropecuaria (SEPSA). Ministerio de Agricultura y Ganadería (MAG), San José, Costa Rica.
- Blacio, C., Fasquelle, R., González, S., 2010. Pineapple value chain analysis. Costa Rica: MAIM.
- Blaikie, P., Brookfield, H., 1987. *Land degradation and society*. Methuen & Co. Press, London, UK.
- Botey, A.P., Garvin, T., Szostak, R., 2014. Interdisciplinary research for ecosystem management. *Ecosystems* 17, 512-521.
- Bouroncle, C., Finegan, B., 2011. Tree regeneration and understory woody plants show diverse responses to forest-pasture edges in Costa Rica. *Biotropica* 43, 562-571.
- Boyle, S.A., Kennedy, C.M., Torres, J., Colman, K., Pérez-Estigarribia, P.E., de la Sancha, N.U., 2014. High-resolution satellite imagery is an important yet underutilized resource in conservation biology. *PloS One* 9, e86908.
- Brannstorm, C., 2009. South America's neoliberal agricultural frontiers: Places of environmental sacrifice or conservation opportunity? *Ambio* 38, 141-149.
- Brotons, L., Mönkkönen, M., Martin, J.L., 2003. Are fragments islands? Landscape context and density–area relationships in boreal forest birds. *American Naturalist* 16, 343-357.
- Butterfield, R.P., 1994. The regional context: Land colonization and conservation in Sarapiquí. In: McDade, L.A., Bawa, K., Hespeneide, H.A., Hartshorn, G.S. (eds.), *La Selva: Ecology and Natural History of a Neotropical Rainforest*. University of Chicago Press, Chicago, IL pp. 317-328.
- CCP, 2011. Centro Centroamericano de Población. Universidad de Costa Rica. Census Data (<http://ccp.ucr.ac.cr/>).

- Chazdon, R.L., Harvey, C., Komar, O., Griffith, D.M., Ferguson, B.G., Martínez-Ramos, M., Morales, H., 2009a. Beyond reserves: A research agenda for conserving biodiversity in human- modified tropical landscapes. *Biotropica* 41, 142-153.
- Chazdon, R.L., Peres, C.A., Dent, D., Sheil, D., Lugo, A.E., Lamb, D., Stork, N.E., Miller, S.E., 2009b. The potential for species conservation in tropical secondary forests. *Conservation Biology* 23, 1406-1417.
- Cushman, S.A., McGarigal, K., Neel, M.C., 2008. Parsimony in landscape metrics: Strength, universality, and consistency. *Ecological Indicators* 8, 691-703.
- Dahlquist, R.M., Whelan, M.P., Winowiecki, L., Polidoro, B., Candela, S., Harvey, C.A., Wulffhorst, J.D., McDaniel, P.A., Bosque-Pérez, N.A., 2007. Incorporating livelihoods in biodiversity conservation: a case study of cacao agroforestry systems in Talamanca, Costa Rica. *Biodiversity Conservation* 16, 2311-2333.
- Daily, G.C., Ceballos, G., Pacheco, J., Suzán, G., Sánchez-Azofeifa, A., 2003. Countryside biogeography of Neotropical mammals: Conservation opportunities in agricultural landscapes of Costa Rica. *Conservation Biology* 17, 1814-1826.
- DeClerck, F., Chazdon, R., Holl, K., Milder, J., Finegan, B., Martínez-Salinas, A., Imbach, P., Canet, L., Ramos, Z., 2010. Biodiversity conservation in human-modified landscapes of Mesoamerica: Past, present, and future. *Biological Conservation* 143, 2301-2313.
- Eigenbrode, S.D., O'Rourke, M., Wulffhorst, J.D., Althoff, D.M., Goldberg, C.S., Merrill, K., Morse, W., Nielsen-Pincus, M., Stephens, J., Winowiecki, L., Bosque-Pérez, N.A., 2007. Employing philosophical dialogue in collaborative science. *BioScience* 57, 55-64.
- Edelman, M. 1999. Peasants against globalization. Rural social movements in Costa Rica. Stanford University Press, Stanford, CA.
- Enríquez, G.C., 1994. Atlas agropecuario de Costa Rica. Universidad Estatal a Distancia, San José, Costa Rica.
- ESRI 2011. ArcGIS Desktop: Release 10.1. Redlands, CA: Environmental Systems Research Institute.
- Evans, J., 1999. Planted forests of the wet and dry tropics: Their variety, nature and significance. *New Forests* 17, 25-36.

- Eycott, A.E., Stewart, G.B., Buyung-Ali, L.M., Bowler, D.E., Watts, K., Pullin, A.S., 2012. A meta-analysis on the impact of different matrix structures on species movement rates. *Landscape Ecology* 27, 1263-1278.
- Fagan, M.E., DeFries, R.S., Sesnie, S.E., Arroyo, S.P., Walker, W., Soto, C., Chazdon, R.L., Sanchún, A., 2013. Land cover dynamics following a deforestation ban in northern Costa Rica. *Environmental Research Letters* 8 DOI:10.1088/1748-9326/8/3/034017.
- Fahrig, L., Baudry, J., Brotons, L.I., Burel, F.G., Crist, T.O., Fuller, R.J., Sirami, C., Siriwardena, G.M., Martin, J-L., 2011. Functional landscape heterogeneity and animal biodiversity in agricultural landscapes. *Ecology Letters* 14, 101-112.
- FAO, 2007. The state of food and agriculture. Food and Agriculture Organization of the United Nations. Rome, Italy.
- FAO, 2011. The state of food and agriculture. Food and Agriculture Organization of the United Nations. Rome, Italy.
- Fischer, J., Lindenmayer, D. B., Manning, A.D., 2006. Biodiversity, ecosystem function, and resilience: Ten guiding principles for commodity production landscapes. *Frontiers in Ecology and the Environment* 4, 80-86.
- Fischer, J., Lindenmeyer, D.B., 2007. Landscape modification and habitat fragmentation: A synthesis. *Global Ecology and Biogeography* 16, 265-280.
- Fold, N., Gough, K.V., 2008. From smallholders to transnationals: The impact of changing consumer preferences in the EU on Ghana's pineapple sector. *Geoforum* 39, 1687-1697.
- Fremier, A.K., DeClerck, F.A.J., Bosque-Pérez, N.A., Estrada Carmona, N., Hill, R., Joyal, T., Keesecker, L., Klos, P.Z., Martínez-Salas, A., Niemeyer, R., Sanfiorenzo, A., Welsh, K., Wulfhorst, J.D., 2013. Understanding spatiotemporal lags in ecosystem services to improve incentives. *BioScience* 63, 472-482.
- Galford, G. L., Melillo, J.M., Kicklighter, D.W., Cronin, T.W., Cerri, C.E.P., Mustard, J.F., Cerri, C.C., 2010. Greenhouse gas emissions from alternative futures of deforestation and agricultural management in the southern Amazon. *Proceedings of the National Academy of Sciences of the United States of America* 107, 19649-19654.
- Gilbert-Norton, L., Wilson, R., Stevens, J., Beard, K., 2010. A meta-analytic review of corridor effectiveness. *Conservation Biology* 24, 660-668.

- Grau, H.R., Aide, T.M., 2008. Globalization and land-use transitions in Latin America. *Ecology and Society* 13, 16. [online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art16/>.
- Grieve, I.C., Proctor, J., Cousins, S.A., 1990. Soil variation with altitude on Volcán Barva, Costa Rica. *Catena* 17, 525-534.
- Guariguata, M.R., Chazdon, R.L., Denslow, J.L., Dupuy, J.M., Anderson, L., 1997. Structure and floristics of secondary and old-growth forest stands in lowland Costa Rica. *Plant Ecology* 132, 107-120.
- Hanson, T., Brunsfeld, S., Finegan, B., Waits, L.P., 2007. Conventional and genetic measures of seed dispersal for *Dipteryx panamensis* (Fabaceae) in continuous and fragmented Costa Rican rain forest. *Journal of Tropical Ecology* 23, 635-642.
- Hanson, T.R., Brunsfeld, S.J., Finegan, B., Waits, L.P., 2008. Pollen dispersal and genetic structure of the tropical tree *Dipteryx panamensis* in a fragmented Costa Rican landscape. *Molecular Ecology* 17, 2060-2073.
- Harvey, C.A., Villanueva C., Villaci's, J., Chaco, M., Muñoz, D., López, M., Ibrahim, M., Gómez, R., Taylor, R., Martínez, J., Navas, A., Saenz, J., Sánchez, D., Medina, A., Vílchez, S., Hernández, B., Pérez, A., Ruiz, F., Lang, I., Sinclair, F.L., 2005. Contribution of live fences on the ecological integrity of agricultural landscapes. *Agriculture, Ecosystems and Environment* 111, 200-230.
- Harvey, C.A., Medina, A., Merlo Sánchez, D., Vílchez, S., Hernández, B., Saenz, J.C., Maes, J.M., Casanoves, F., Sinclair, F.L., 2006. Patterns of animal diversity in different forms of tree cover in agricultural landscapes. *Ecological Applications* 16, 1986-1999.
- Harvey, C.A., Villalobos, J.A.G., 2007. Agroforestry systems conserve species-rich but modified assemblages of tropical birds and bats. *Biodiversity Conservation* 16, 2257-2292.
- Harvey, C. A., Komar, O., Chazdon, R., Ferguson, B.G., Finegan, B., Griffith, D.M., Martínez-Ramos, M., Morales, H., Nigh, R., Soto-Pinto, L., Van Breuge, M., Wishnie, M., 2008. Integrating agricultural landscapes with biodiversity conservation in the Mesoamerican hotspot. *Conservation Biology* 22, 8-15.
- Hecht, S., Kandel, S., Gomes, I., Cuellar, N., Rosa, H., 2005. Globalization, forest resurgence and environmental politics in El Salvador. *World Development* 34, 308-323.

- Holdridge, L.R., Grenke, W.G., Haheway, W.H., Liang, T., Tosi, J.J.A., 1975. Forest environments in tropical life zones. Pergamon Press, New York, NY.
- Holmann, F., Rivas, L., Pérez, E., Castro, C., Schuetz, P., Rodríguez, J., 2008: The beef chain in Costa Rica: Identifying critical issues for promoting its modernization, efficiency, and competitiveness. *Livestock Research for Rural Development* 20, 51. Retrieved June 26, 2014, from [online] URL: <http://www.lrrd.org/lrrd20/4/holmb20051.htm>.
- Hyden, G., Kates, R.W., Turner II, B.L., 1993. Beyond intensification. In: Turner II, B.L., Hyden, G., Kates, R.W. (eds.), *Population growth and agricultural change in Africa*. University of Florida Press, Gainesville, FL pp. 401-439.
- IEG, 2011. The Mesoamerican Biological Corridor. Regional Program Review. Independent Evaluation Group 5 (2). The World Bank Group, Washington, DC.
- INEC, 2011. Instituto Nacional de Estadísticas y Censos de Costa Rica. Census Data (<http://www.inec.go.cr/>).
- ITCR, 2008. Atlas de Costa Rica. Instituto Tecnológico de Costa Rica, Cartago, Costa Rica.
- Jackson, L.E., Pulleman, M.M., Brussaard, L., Bawa, K.S., Brown, G.G., Cardoso, I.M., de Ruiten, P.C., García-Barrios, L., Hollander, A.D., Lavelle, P., Ouédraogo, E., Pascual, U., Setty, S., Smukler, S.M., Tschardtke, T., Van Noordwijk, M., 2012. Social-ecological and regional adaptation of agrobiodiversity management across a global set of research regions. *Global Environmental Change* 22, 623-639.
- Karp, D.S., Rominger, A.J., Zook, J., Ranganathan, J., Ehrlich, P.R., Daily, G.C., 2012. Intensive agriculture erodes b-diversity at large scales. *Ecology Letters* 15, 963-970.
- Kaufmann, J.C., 2011. *L'entretien compréhensif*. Armand Colin, Paris, France.
- Kilian, B., Hettinga, J., Jiménez, G.A., Molina, S., White, A., 2012. Case study on Dole's carbon-neutral fruits. *Journal of Business Research* 65, 1800-1810.
- Kupfer, J.A., Malanson, G.P., Franklin, S.B., 2006. Not seeing the ocean for the islands: The mediating influence of matrix-based processes on forest fragmentation effects. *Global Ecology and Biogeography* 15, 8-20.
- Lambin, E.F., Geist, H.J., Lepers, E., 2003. Dynamics of land use and land cover change in tropical regions. *Annual Review of Environmental Resources* 28, 205-241.

- Lambin, E.F., Meyfroidt, P., 2011. Global land use change, economic globalization, and the looming land scarcity. *Proceedings of the National Academy of Sciences of the United States of America* 108, 3465–3472.
- Laurance, W.F., Camargo, J.L.C., Luizão, R.C.C., Laurance, S.G., Pimm, S.L., Bruna, E.M., Stouffer, P.C., Williamson, G.B., Benítez-Malvido, J., Vasconcelos, H.L., Van Houtan, K.S., Zartman, C.E., Boyle, S.E., Didham, R.K., Andrade, A., Lovejoy, T.E., 2011. The fate of Amazonian forest fragments: A 32-year old investigation. *Biological Conservation* 144, 56-67.
- Lee, J., Gereffi, G., Beauvais, J., 2012. Global value chains and agrifood standards: Challenges and possibilities for smallholders in developing countries. *Proceedings of the National Academy of Sciences of the United States of America* 109, 12326-12331.
- Letcher, S.G., Chazdon, R.L., 2009. Rapid recovery of biomass, species richness, and species composition in a forest chronosequence in Northeastern Costa Rica. *Biotropica* 41, 608-617.
- MAG, 2005. Ministerio de Agricultura y Ganadería de Costa Rica. Censo Agropecuario (<http://www.mag.go.cr/>).
- Matson, P.A., Vitousek, P.M., 2006. Agricultural intensification: Will land spared from farming be land spared for nature? *Conservation Biology* 20, 709-710.
- McDade, L., Bawa, K.S., Hespeneide, H.A., Hartshorn, G.S., (eds.), 1994. *La Selva: Ecology and natural history of a Neotropical rain forest*. University of Chicago Press, Chicago, IL.
- McIntyre, S., Hobbs, R., 1999. A framework for conceptualizing human effects on landscapes and its relevance to management and research models. *Conservation Biology* 13, 1282-1292.
- MEA, 2007. *Millennium Ecosystem Assessment. A toolkit for understanding and action*. Island Press, Washington, DC.
- Milder, J.C., DeClerk, F.A.J., Sanfiorenzo, A., Merlo Sánchez, D., Tobar, D.E., Zuckerberg, B., 2010. Effects of farm and landscape management on bird and butterfly conservation in western Honduras. *Ecosphere* 1, 2. DOI: 10.1890/ES10-00003.1.
- Morse, W.C., Schedlbauer, J.L., Sesnie, S.E., Finegan, B., Harvey, C.A., Hollenhorst, S.J., Kavanagh, K.L., Stoian, D., Wulfhorst, J.D., 2009. Consequences of environmental

service payments for forest retention and recruitment in a Costa Rican biological corridor. *Ecology and Society* 14, 23. [online] URL:

<http://www.ecologyandsociety.org/vol14/iss1/art23/>.

- Morton, D.C., DeFries, R.S., Shimabukuro, Y.E., Anderson, L.O., Arai, E., Espirito-Santo, F.B., Freitas, R., Morisette, J., 2006. Cropland expansion changes deforestation dynamics in the southern Brazilian Amazon. *Proceedings of the National Academy of Sciences of the United States of America* 103, 14637-14641.
- Norden, N., Chazdon, R.L., Chao, A., Jiang, Y.H., Vílchez-Alvarado, B., 2009. Resilience of tropical rain forests: Tree community reassembly in secondary forests. *Ecology Letters* 12, 395-394.
- Ormerod, S.J., Marshall, E.J.P., Kerby, G., Rushton, S.P., 2003. Meeting the ecological challenges of agricultural change: Editors' introduction. *Journal of Applied Ecology* 40, 939-946.
- Ostrom, E., 2007. A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America* 104, 15181-15187.
- Pan, Y., Birdsey, R.A., Fang, J., Houghton, R., Kauppi, P.E., Kurz, W.A., Phillips, O.L., Shvidenko, A., Lewis, S.L., Canadell, J.G., Ciais, P., Jackson, R.B., Pacala, S.W., McGuire, A.D., Piao, S., Rautiainen, A., Sitch, S., Hayes, D., 2011. A large and persistent carbon sink in the world's forests. *Science* 333, 988-993.
- Peet, R., Robbins, W.P., Watts, T.M., (eds.), 2011. *Global political ecology* preface. Routledge, London, UK.
- Pérez Pelaez, M., Alvarado Salas, R., 2003. Los planes reguladores en Costa Rica: Cantonales y Costeros. Dirección de Gestión Municipal. Sección de Investigación y Desarrollo. Serie Ordenamiento Territorial: 2. Instituto de Fomento y Asesoría Municipal, Costa Rica.
- Perfecto, I., Mas, A., Dietsch, T., Vandermeer, J., 2003. Conservation of biodiversity in coffee agroecosystems: A tri-taxa comparison in southern México. *Biodiversity and Conservation* 12, 1239-1252.
- Perfecto, I., Vandermeer, J., 2008. Biodiversity conservation in tropical agroecosystems - A new conservation paradigm. *Annals of the New York Academy of Science* 1134, 173-200.

- Piñero, M., Díaz Ríos, L.B., 2007. Implementation of good practices in the production of fresh pineapples for export: Case study of the Huetar Norte region, Costa Rica. In: Piñero, M., Díaz Ríos, L.B. (eds.), *Implementing programmes to improve safety and quality in fruit and vegetable supply chains: benefits and drawbacks*. Latin American case studies. Food and Agriculture Organization of the United Nations, Rome, Italy pp. 62-73.
- Polidoro, B.A., Dahlquist, R.M., Castillo, L.E., Morra, M.J., Somarriba, E., Bosque-Pérez, N.A., 2008. Pesticide application practices, pest knowledge, and cost-benefits of plantain production in the Bribri-Cabecar Indigenous Territories, Costa Rica. *Environmental Research* 108, 98-106.
- Prevedello, J.A., Vieira, M.V., 2010. Does the type of matrix matter? A quantitative review of the evidence. *Biodiversity Conservation* 19, 1205-1223.
- Programa Estado de la Nación, 2010. *Decimosexto Informe Estado de la Nación en Desarrollo Humano Sostenible*. Programa Estado de la Nación. San José, Costa Rica.
- Robbins, P., 2004. *Political ecology. A critical introduction*. Blackwell Publishing, West Sussex, UK.
- Robson, J.P., Berkes, K., 2011. Exploring some of the myths of land use change: can rural to urban migration drive declines in biodiversity? *Global Environmental Change* 21, 844-854.
- Sáenz-Segura, F., D'Haese, M., Schipper, R.A., 2007. A seasonal model of contracts between a monopsonistic processor and smallholder pepper producers in Costa Rica. *Agricultural Systems* 103, 10-20.
- Sayer, J., Sunderland, T., Ghazoul, J., Pfund, J-L., Sheil, D., Meijaardb, E., Ventera, M., Boedhihartonoa, A.K., Dayb, M., Garcia, C., van Oostenj, C., Buck, L.E., 2012. Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences of the United States of America* 110, 8349-8356.
- Schedlbauer, J.L., Finegan, B., Kavanagh, K.L., 2007. Rain forest structure at forest-pasture edges in Northeastern Costa Rica. *Biotropica* 39, 578-504.
- Schelhas, J., Sánchez-Azofeifa, G.A., 2006. Post-frontier forest change adjacent to Braulio Carrillo National Park, Costa Rica. *Human Ecology* 34, 408-431.

- Schuster, C., Förster, M., Kleinschmit, B., 2011. Testing the red edge channel for improving land-use classifications based on high-resolution multi-spectral satellite data. *International Journal of Remote Sensing* 33, 5583-5599.
- Sesnie, S., Finegan, B., Gessler, P., Ramos, Z., 2009. Landscape-scale environmental and floristic variation in Costa Rican old-growth rain forest remnants. *Biotropica* 4, 16-26.
- Sibelet, N., Mutel, M., Arragon, P., Luye, M., 2013. Qualitative survey methods applied to natural resource management. Online Learning Modules. Available at: [Http://Enquetes-Cirad.Iamm.Fr/](http://Enquetes-Cirad.Iamm.Fr/).
- Sierra, R., Russman, E., 2006. On the efficiency of environmental service payments: A forest conservation assessment in the Osa Peninsula, Costa Rica. *Ecological Economics* 59, 131-141.
- Sollins, P., Sancho, F., Mata, R., Sanford, R.L., 1994. Soils and soil process research. In: McDade, L.A., Bawa, K.S., Hespeneide H.A., Hartshorn G.S. (eds.), *La Selva: Ecology and natural history of a Neotropical rain forest*. University of Chicago Press, Chicago, IL pp. 34–53.
- Thrupp, L.A., 1995. Bittersweet harvests for global supermarkets: challenges in Latin America's agricultural export boom. World Resources Institute, Washington, DC.
- Tilman, D., Cassman, K.G., Matson, P.A., Naylor, R., Polasky, S., 2002. Agricultural sustainability and intensive production practices. *Nature* 418, 671-677.
- Tscharntke, T., Clough, Y., Wanger, T.C., Jackson, L., Motzke, I., Perfecto, I., Vandermeer, J., Whitbread, A., 2012. Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation* 151, 53-59.
- Turner, M.G., 2005. Landscape ecology: What is the state of the science? *Annual Review of Ecology, Evolution and Systematics* 36, 319-344.
- Turner II, B.L., Robbins, P., 2008. Land-change science and political ecology: Similarities, differences, and implications for sustainability science. *Annual Review of Environment and Resources* 33, 295-316.
- Vagneron, I., Faure, G., Loeillet, D., 2009. Is there a pilot in the chain? Identifying the key drivers of change in the fresh pineapple sector. *Food Policy* 34, 437-446.
- van Vliet, N., Mertz, O., Heinimann, A., Langanke, T., Pascual, U., Schmook, B., Adams, C., Schmidt-Vogt, D., Messerli, P., Leisz, S., Castella, J-C., Jørgensen, L., Birch-Thomsen,

- T., Hett, C., Bech-Bruun, T., Ickowitz, A., Chi Vu, K., Yasuyuki, K., Fox, J., Padoch, C., Dressler, W., Ziegler, A.D., 2012. Trends, drivers and impacts of changes in swidden cultivation in tropical forest-agriculture frontiers: A global assessment. *Global Environmental Change* 22, 418-429.
- Vaughan, C., Ramírez, O., Herrera, G., Guries, R., 2007. Spatial ecology and conservation of two sloth species in a cacao landscape in Limón, Costa Rica. *Biodiversity and Conservation* 16, 2293-2310.
- Vílchez Mendoza, S., Harvey, C.A., Sáenz, J.C., Casanoves, F., Carvajal, J.P., González Villalobos, J., Hernández, B., Medina, A., Montero, J., Sánchez Merlo, D., Sinclair, F.L., 2014. Consistency in bird use of tree cover across tropical agricultural landscapes. *Ecological Applications* 24, 158-168.
- Villegas, O., Vargas, F., Pérez, J.A., García, R., Porras, S., Meneses, D., Quesada, A., Delgado, G., Alpizar, D., Mora, B., León, R., Alfaro, D., 2007. Caracterización y plan de acción para el desarrollo de la agrocadena de piña en la región Huetar Norte. Ministerio de Agricultura y Ganadería (MAG). Dirección Regional Huetar Norte. Ciudad Quesada, Costa Rica.
- Watson, V., Cervantes, S., Castro, C., Mora, L., Solis, M., Porras, I.T., Cornejo, B., 1998. Making space for better forestry. Policy that works for forests and people. Series no. 6. Centro Científico Tropical and International Institute for Environment and Development, San José, Costa Rica and London, UK.
- Whitcomb, R.F., Robbins, C.S., Lynch, J.F., Whitcomb, B.L., Klimkiewicz, M.K., Bystrak, D., 1981. Effects of forest fragmentation on avifauna of the eastern deciduous forest. In: Burgess, R.L., Sharpe, D.M. (eds.), *Forest island dynamics in man-dominated landscapes*. Springer, Berlin Heidelberg New York, pp. 125–205.
- Wu, J.J., 2013. Landscape ecology. In: Leemans, R. (ed.), *Ecological systems. Selected entries from the Encyclopedia of Sustainability Science and Technology*. Springer New York, pp. 179-200.

Chapter 2

Rural Migration to the Costa Rican Frontier: Understanding Migrant Motivations for Migration and Migrant Quality of Life

Abstract

Frontiers are unstable; both spatially and economically they are situated at the margins of national and world economies. The nature of these places makes frontier migration a risky endeavor for individuals and their families, yet this form of migration remains largely ignored in migration research. This article utilizes a household ethno-survey to track and describe migration dynamics in the northern frontier of Costa Rica and the subsequent improvements or decreases in migrant quality of life. Data reveal that both international and internal migrants came in two major flows to the Costa Rican frontier. Migrants to Costa Rica were initially motivated by land availability, and then by growing labor opportunities, cheaper housing and lower costs of living. The most recent migrants came seeking the various environmental amenities found in the Costa Rican frontier. Generally, young and maturing households experience higher quality of life as measured by income, demographic variables and education when established on the frontier, as compared to mature households, who despite their extended duration on the frontier, later life stage and land resources experience a lower quality of life. Understanding how different types of families fare and persist in these frontiers is a critical step toward exploring how rural development evolves on a human and household level and toward understanding how to mitigate frontier migration's negative human and ecological outcomes.

Introduction

The frontier is a peripheral region that is in a process of increasing integration into the national and global capitalist economy (Barbier 2012). This integration includes a process of social, economic, and ecological change, where human lives and landscapes are reconstructed (Marquette 2006). Migrating to the frontier is a risky household decision; most socio-economic conditions are likely to decline given the limited infrastructure, lack of governance, and low educational and employment opportunities (Carr 2009). Frontier migrants seek to improve their life despite considerable risk and often their resultant quality of life and experiences are heterogeneous and geographically uneven (Marquette 2006).

Previous research in Costa Rica and other Central American and Amazonian countries demonstrates that frontier migration is most commonly driven by governmental programs to settle these frontiers. Such programs can both improve or inhibit migrant quality of life and mobility (Schelhas and Sanchez-Azofeifa 2006, Butterfield 1994, Marquette 2006). After colonization, migrant quality of life and mobility on the frontier are more often dictated by micro level household characteristics and the lifecycle stage of the household, such as, asset endowments, economic diversification into off farm sectors, health, and the number of dependents in a household (Caviglia-Harris et al. 2013, Browder 2008, Barbier 2012).

Patterns of frontier migration encompass highly selective migration pathways, which are associated with the poorest, largest, and least educated families throughout Central America (Jepson 2006, Barbier 2012). Frontier migration can be characterized as rural to rural migration or urban to rural migration, or more generally as migration to “an area not yet

developed or integrated into the national economic system, but where those systems are nascent and taking root” (quoted in Marquette 2006). Populations migrating to the frontier can be both internal migrants and international migrants, primarily, south-south migrants. Rural migration is an understudied but integral part of the set of contemporary issues regarding rural development, agricultural production and biodiversity conservation in tropical forest frontiers (Carr 2009). Our research in this paper provides rich descriptions of migrant motivations and outlines migrant household characteristics and fundamental indicators of quality of life to contribute to our understanding of the political, economic and social drivers of rural migration and migrant quality of life on the frontier.

Since frontier migrants migrate to regions at forest boundaries and tend to seek land for agricultural production, they are the key drivers of deforestation and tropical landscape change (Carr 2009). Frontier migration, as a human driver of landscape change, has been extensively studied to understand tropical deforestation in much of the literature focusing upon land use change (Lambin et al. 2003). However, researching frontier migrants’ experiences beyond their land use change impacts is often neglected (as argued by Marquette 2006). In contrast to the majority of these studies, our research is a people centered inquiry that focuses on human quality of life on the frontier and contributes to rural sociology.

In rural sociology, the focus of inquiry is on understanding human experience in peripheral regions in relation to world systems and the process of capitalist incorporation (Labao 1996). In this line of inquiry, the frontier is a socio-spatial territorial unit where the process of capitalist incorporation of household economies and the regional economy is particularly clear

and observable (Hall 2000, Labao 1996). Furthermore, the process of capitalist incorporation of the frontier into the national and global economy is seen as a critical structural factor that initiates and perpetuates migration to and from the frontier (Hamilton and Chinchilla 1991).

The study region of this paper's research is located within the north-central frontier of Costa Rica and borderland with Nicaragua (Figure 1). This region is growing in population and is undergoing dramatic demographic and socioeconomic change as it is being increasingly integrated into the national and international economy (INEC 2011, Rodriguez and Avendaño 2005). As the majority of residents are migrants, we need to examine who migrated to the frontier and why, and how migrants are faring socio-economically on the frontier. This article presents a cross-sectional analysis of frontier migrants, when and why they came to the frontier and then compares households at different lifecycle stages, or age groups, to reveal the factors that shape migrant quality of life.

Conceptual Framework

Frontiers

The frontier is the most recent peripheral region being incorporated into the national or global economy. The frontier operates as a *spatial fix* for national and global economic growth and accumulation. It is a space that provides a fresh store of resources, such as land, labor and natural resources and integrates them into the larger economy (Harvey 2005). State programs initiate territorial integration of frontiers through agrarian reform, land distribution, and infrastructure investment and transportation networks (Jepson 2006). Historically, in Central America the frontier also operated as a political maneuver. The frontier was used as a safety

valve, to ease the rural poor, to “serve as the employer of the last resort for underemployed, unskilled labor” and to become a refuge for subsistence farmers seeking small plots of land (Barbier 2012, Brockett 1998). Macro-economic conditions, such as commodity booms, economic crises, structural adjustment policies and globalization also effect the frontier. These factors accelerate the migration flows to and from the frontier and dictate the pace of development and process of incorporation on the frontier (Hecht 2005).

Frontiers are characterized by a compressed development process as they are the last to be integrated and often are integrated at a more rapid pace than core regions. Often, the development of frontiers is spatially uneven, characterized by boom and bust cycles (Barbier 2012). Frontier development requires substantial migration of people and capital as well as state investment into infrastructure, public services and transportation (Barbier 2012). For these reasons, frontiers can also be characterized by a high turnover rate of inhabitants, especially of early migrants. Population decline after an initial settlement rush and land abandonment or land consolidation over time is typical (Barbier 2012). These ‘failed frontiers’ are sometimes called “hollow frontiers,” and are areas characterized by out migration, forest recovery and regrowth (Rudel et al. 2005). Frontier development represents a compressed, geographically specific, heterogeneous process of economic incorporation. Studying migration patterns to the frontier and migrant quality of life on the frontier gives insight into how incorporation, as an uneven social and economic process, is expressed in the lives and quality of life of migrant households.

Who Migrates To The Frontier?

After the global debt crisis of 1980, migration in Central America shifted away from urban centers and towards secondary cities and rural frontiers (Carr 2009). One third of all migrants in Latin American countries, where data exists, are migrants to the frontier; they are both internal and international, rural-to-rural migrants, and urban-to-rural migrants. Rural migrants are understudied in migration literature (Carr 2009) and few migration studies integrate analysis of both international and internal migration flows (noted by King and Skeldon 2010). Push and pull factors that encourage migration to the frontier differ by the degree of the frontier's maturity, time of settlement and the characteristics of each population cohort (Barbier 2012). As the frontier ages, it becomes a landscape of the different population cohorts who arrive at different life stages and who each have distinct household characteristics. Early migrants, especially, are pushed to the frontier by poverty and unequal land distribution in the sending regions and pulled by the cheap and available land and by state sponsored settlement incentives on the frontier. Such migrants often prioritize land ownership over the lower wages and limited employment opportunities on the frontier when compared to other more developed regions (Carr 2009). Later waves of migrants tend to be pulled by social ties or growth in local labor markets although if land is still available, it remains a significant pull factor. These migrants may also value higher security or the rural lifestyle above the typical decrease in wages, employment opportunities and quality of services (Ibid).

International Migrants

International migrants in northern Costa Rica are primarily south-south migrants from Nicaragua. This pattern is consistent with migration patterns observed in other developing countries, where more than one half of the populations migrating do so between different developing countries in the global south rather than to a northern developed country (Gindling 2009). According to neoclassical theory, south-south migrants are pushed from their origins and pulled to receiving regions as a result of economic decision making, moving from a labor surplus, low wage country to a labor scarce, high wage country (Lundquist and Massey 2005). Costa Rica has a per capita income three times that of Nicaragua and a significant demand for low wage, low skilled labor, predominantly in agriculture, construction or domestic work (Lundquist and Massey 2005, Marquette 2006 b.). Though economic reasons may dominate migration initiation, migration research also finds that shared culture, language, and geographic proximity also encourage migration (Castles and Miller 2009). Strong social networks typically facilitate Nicaraguan migration to Costa Rica (Marquette 2006 b.), however Lee (2010) found that most Nicaraguan migrants working in export agriculture in the study region migrated there both internationally and internally with mostly weak social ties.

Conflict and violence are also major push factors associated with south-south migrant initiation across Central America (Lundquist and Massey 2005). From 1980-1990, many Nicaraguans became refugees in Costa Rica in response to the Contra War. This was in part due to proximity, as Nicaragua borders Costa Rica, but was also facilitated by the political and economic stability of Costa Rica, which has been counter to the prevailing trend of political instability and poverty in other Central American countries and is attractive to

migrants seeking asylum (Lundquist and Massey 2005, Hamilton and Chinchilla 1991). However, economic hardship and political persecution are hard to differentiate as separate factors that initiate migration and often occur simultaneously (Lundquist and Massey 2005). For this reason, older Nicaraguans within Costa Rica are often both political and economic migrants. These migrants also exhibit a two-step migration process (King and Skeldon 2010), first entering Costa Rica as international migrants for political reasons and then proceeding as internal migrants within Costa Rica for economic reasons.

Nicaraguan populations are spatially concentrated in Costa Rica in the central urban area of San Jose (40%), and in the northern frontier, or the Huetar Norte region (30%) where the study region is located (Figure 1) (Marquette 2006 b.). Nicaraguan households in Costa Rica have different characteristics than Costa Rican households. They are concentrated in lower paid economic sectors, principally agriculture in rural regions. Nicaraguan migrants account for 10% of the national labor force in agriculture (Marquette 2006 b.). Most of the Nicaraguan population in Costa Rica is economically active, with 70% of the population being comprised of working age adults from 20-39 (Marquette 2006 b.). They tend to have bigger families, lower education and experience poverty more severely than Costa Rican households (Marquette 2006 b.). Border regions, like the study region along the northern frontier are centers of poverty for Nicaraguan households.

Internal Migrants

Literature tracking internal migration to frontiers is sparse for Costa Rica (for example, Golley et al. 1971, Sewastynowicz 1986, Cruz et al. 1992, Butterfield 1994, Schelhas and

Sanchez-Azofeifa 2006, Kull et al. 2007, Lee 2010). Historically, Costa Rica is characterized by significant concentration of settlement in the central valley-- the capital city center and suburbs of San Jose. It was not until well into the 1960s that settlement radiated out into the peripheral regions of the country (Augelli 1987). In part due to this pattern of settlement, spatial inequalities have been particularly pronounced in Costa Rica when compared to other Central American countries (Hall 1984). In Costa Rica, there are major discrepancies between regions regarding infrastructure, transportation, governance, population, and quality of life (Hall 1984, Seligson 1979).

Internal migrants in Costa Rica were initially motivated to migrate due to land inequality, population growth and urban and rural poverty - especially during the debt crisis in 1980 when major settlement of the study region began and migration pathways shifted from urban destinations to the frontier (Cruz et al. 1992). Land consolidation, degradation and the low labor demand in rural cattle regions, which grew substantially with the 'hamburger connection' between the United States and Costa Rica for beef exports from 1950-1980, also pushed landless farmers towards the frontier (Augelli 1987). The government-sponsored settlement of migrants, through low interest mortgages, land titling and intervention in squatter land disputes functioned as a pull to the frontier. The government was also charged with providing transportation networks and critical infrastructure (i.e. potable water, communications, electricity), which was accomplished slowly and unevenly, due to limited state resources but nonetheless attracted migrants to the frontier (Seligson 1979, Schelhas and Sanchez-Azofeifa 2006). As the frontier develops, labor demand increases and draws labor-seeking migrants into the rapidly developing industries such as export agriculture or tourism

(Barbier 2012). As road access and the quality of life improve on the frontier, 'rural restructuring' occurs whereby, through the process of capitalist incorporation, traditional agriculture, economic activities and social relations transition to those associated with post-productivist or multifunctional landscapes (Gosnell and Abrams 2011). In these environments, amenity migration becomes more prominent, drawing migrants to rural regions for security, aesthetic, quality of life, or lifestyle reasons (Gosnell and Abrams 2011). In Costa Rica amenity migrants tend to be wealthier urban to rural migrants who engage in agriculture or ranching for a hobby, or are absentee landowners who weekend in the countryside and have locals take care of their farms (Schelhas and Sanchez-Azofeifa 2006).

Migrant Quality Of Life

Social reproduction, demographic characteristics and social wellbeing are key conceptual elements to understand differences between populations in the periphery in comparison to the core, or to understand differences among frontier populations (Lobao 1996). This section of the research informs our fundamental understanding of these dynamics on the Costa Rican frontier.

In this paper, as in other frontier studies (see de Sherbinin et al. 2008, Marquette 2006) social wellbeing or migrant quality of life is defined primarily in economic terms indicated by assets, education and income variables, which are then conditioned by household demographic characteristics, such as fertility and the number of dependents present. Life cycle stages are central to developing a fundamental understanding of quality of life and are used in studies of populations, their land use decision-making and livelihood strategies in

frontier regions (Walker et al. 2002). Life cycle stages are defined by the household head's age (i.e. young, maturing, mature) and serve as a heuristic category to discuss demographic and economic constraints and opportunities that frame wealth and quality of life over the life span of a household (Walker et al. 2002). Life cycle theory recognizes that households are the principal unit of production and reproduction and decision-making (de Sherbinin et al. 2008). It emphasizes that the capabilities of the rural poor are based on their access to and ownership of natural capital, social capital, human capital, physical capital, and financial capital (Scoones 2009). Wealth is comprised of a combination of these assets, and wealth at any moment is a function of past accumulation and investment that are always shaped by historical and current structural opportunities and constraints (de Sherbinin et al. 2008).

For this reason, quality of life on the frontier is conditioned by historical periods or events, structural factors (political, organizational, institutional and socio-economic), and household characteristics (Marquette 2006). Early migrants to the frontier will mature on the frontier as the frontier itself matures. They are often the most resilient class of migrants, primarily a function of their durability on the frontier and ability to adapt to changing conditions. Sometimes they can accumulate significant resources due to early land acquisition and demographic maturity (Marquette 2006). However, if they arrive on the frontier in marginal economic condition and encounter low quality land, limited infrastructure and marginal agricultural markets, they either abandon the frontier and out-migrate or persist in a marginal state (Caviglia-Harris et al. 2013). This persistence in a marginal state is called negative path dependency, where the intersection of social, economic and ecological marginality constrains mobility. The concept of negative path dependency is a major part of understanding early land

migrants in this paper's study region and, generally speaking, of understanding the incompleteness of capitalist incorporation of populations at the margins of the global economy (Bush 2005).

Although quality of life on the frontier is influenced by many of the same factors as it is in other regions, the frontier also provides its own unique combination of problems and opportunities for wellbeing. Frontier specific factors that can detract from a good quality of life on the frontier include the following and are summarized by Marquette (2006):, younger household life stage (i.e. high number of dependents, unstable economic situation), poor land, land insecurity, limited public services or infrastructure, high transportation costs, or limited time on the frontier. Likewise, because of the low levels of infrastructure on the frontier and the selectivity of frontier migrants with low socio-economic status, issues such as low levels of education and low initial resource endowments tend to be prevalent on the frontier. Some of the common factors that improve quality of life which are particularly salient on the frontier include the following: longer duration living on the frontier, mature household (i.e. fewer dependents, accumulated resources), strong markets (i.e. deeply integrated into national and global economy), early migration to the frontier when land was cheap and abundant, initial wealth, availability of adult male labor in the household, higher levels of education, commodity booms or favorable government policy towards the frontier (Marquette 2006). As families move through different life cycle stages they will experience different levels of labor availability, economic resources, and the number of dependents in the household will decrease as they age (Browder et al. 2008, Marquette 2006). Migrant quality of life is thus

always evolving on the level of the household, in step with changes in life cycle stages, and intersecting with external conditions on the frontier.

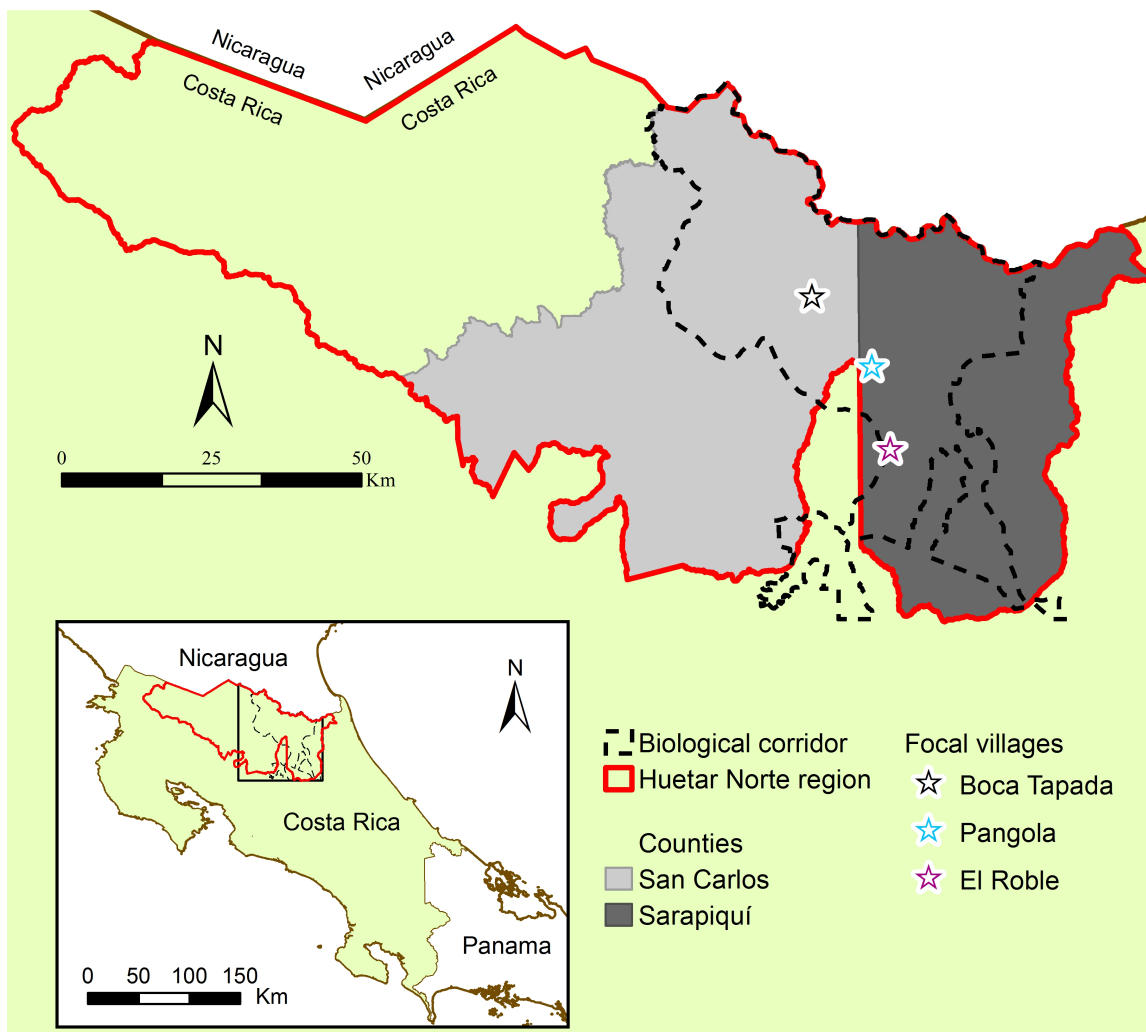
Study Region

This research focuses on the northern Costa Rica frontier of the Huetar Norte region. This frontier is currently designated as closed meaning it has reached an advanced stage of frontier development and deforestation has stabilized along with population growth (Marquette 2006, Schelhas and Sanchez-Azofeifa 2006). However, due to the rapid and continual population growth, that claim should be re-evaluated as a terminal process. Conservation policy, namely the Forest Law of 1996, has prohibited land use change on private and public land effectively retaining remaining forest and making continued deforestation illegal (Morse et al. 2009). This has essentially closed the forest frontier in regions where the conversion of forest to agriculture occurs but the frontier as a socio-demographic process has not ended.

Currently, Sarapiquí County, the principal receiving county in the study region (Figure 1), has the fourth largest population of Nicaraguan immigrants of all counties in Costa Rica (INEC 2011). Furthermore, Sarapiquí County continues to be a major internal migration destination for Costa Ricans. It is the only rural county in Costa Rica experiencing net population increase and is the second fastest growing of all Costa Rican counties (INEC 2011). However, this region has not always been a migration destination. Migration to this region - in concert with rural migration trends across Central America - was initiated as a solution to the global economic crisis of 1980, with the region serving as a refuge for the urban and rural poor (Cruz et al. 1992). Sarapiquí also became a key region for the establishment of non-traditional

export agriculture, which was a key component of economic recovery and was predicated on the global incorporation of the agricultural economy as defined in the economic reforms that precipitated after the debt crisis (Edelman 1999).

Figure 1. Map of Study Region, Focal Villages and Selected Counties



In Costa Rica, during the debt crisis, real wages dropped by 30 percent and unemployment doubled (Edelman 1999). Widespread poverty shifted migration trends away from urban centers and established rural villages and towards the forested frontier (Cruz et al. 1992).

Costa Rica was the only Central American country characterized from the late 1970's to early 80's by positive net urban to rural migration and the frontier emerged as a major receiving region for both urban and rural migrants (Cruz et al. 1992). This trend was especially important for the settlement of the Sarapiquí region.

The Institute of Agrarian Development (IDA formerly ITCO) initiated the opening of the northern frontier in the Huetar Norte Region to accommodate new migrants and calm existing rural unrest caused by unequal land distribution from cattle production, rising urban and rural unemployment and the relocation of banana companies from the south to the northern Atlantic and Sarapiquí regions (Schelhas and Sanchez-Azofeifa 2006). During this time, the study region was one of the most active squatter zones in the country (Butterfield 1994) and IDA struggled to purchase land and reclaim abandoned land in order to repartition it into 6-20 hectare plots. IDA then sold these plots at a discounted price with a low interest 15-year mortgage to families that met the qualifications based on low socio-economic status and need (Schelhas and Sanchez-Azofeifa 2006). Over 50% of the government-sponsored land acquisition and settlement during this time was in forested areas with poor to good agricultural soils. During this period, 4% of Costa Rican forest was being lost a year, one of the highest deforestation rates in Central America at this time (Cruz et al. 1992, Augelli 1987). Marginal ecological conditions for agricultural production undermined smallholder success in some places, especially where transport networks were also lacking (Cruz et al. 1992). In 1986, the road was built from San Jose to Limon, which facilitated infrastructural development, permanent settlement and export crop expansion in the Sarapiquí region (Morse et al. 2009). By 2000, IDA settlements totaled more than 200,000 hectares, and had benefited

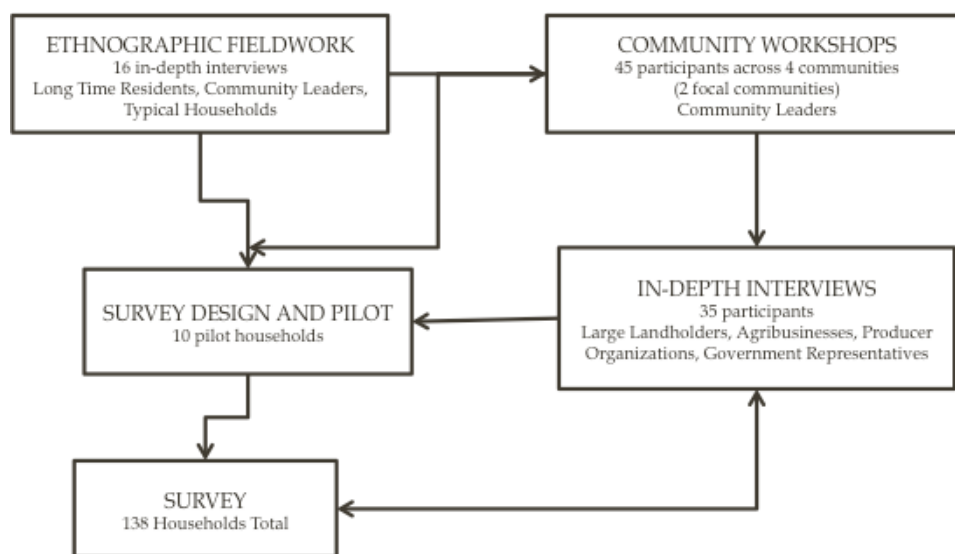
about 14,000 families in 186 colonies in the Huetar Norte region (Faure and Samper 2004), which encompasses the study region (see Figure 1).

Land acquisition laws and titling practices facilitated speculative land investment, sale and turnover as deforesting or ‘improving’ land for immediate sale became a business of its own (Cruz et al. 1992). Many IDA plots were resold to people who did not qualify as low socio-economic status by people who did not yet have title to the land, which is only attained after 15 years of residence on the plot (Cruz et al. 1992, Schelhas and Sanchez-Azofeifa 2006). Speculative land investment by larger landholders, poor agricultural conditions and the lack of basic infrastructure and transportation networks undermined the long-term success of many of these government colonies and eventually led to early migrant abandonment, land consolidation and a high prevalence of absentee ownership, especially in geographically remote regions (Schelhas and Sanchez-Azofeifa 2006, Morse et al. 2009). Transportation networks still remain a major barrier for many of the more remote colonies and in several cases the few remaining residents caretake large tracts of absentee owned land. However, and despite early out migration, migration to the frontier is increasing with local labor market expansion into pineapple and tourism industries and the continued development of rural centers like Puerto Viejo and La Virgen. The study region has experienced an accelerated and compressed development process in the past 30 years and is continuing to undergo dramatic demographic change. For this reason, this region presents an ideal setting to research migration dynamics and migrant quality of life outcomes on the frontier.

Methods

Field research was conducted from 2011-2013 over a period of 12 months, and utilized a sequential mixed method design (Creswell 2009) including, participant observation and ethnographic field methods, community workshops, a household survey and semi structured in-depth interviews (Table 1, see Appendices). Here, each method is used to inform the following method, capture missing or inadequately detailed data in previously employed methods, to maximize the strengths of each method in a complementary fashion and finally, to gather data at multiple scales from the household, community and larger regional and national scales. For example, ethnographic fieldwork and community workshops were fundamental to designing the interview guide, identifying key informants, and developing the survey language, questions, responses and scales.

Table 1. Diagram of Sequential Mixed Methods



Community Workshops

Workshops were conducted in 2 villages, Pangola and El Roble, within the study region to understand the settlement history, evolution of the villages and context for rural community

development. Village leaders were invited for a 4-hour workshop to discuss the history of their village, challenges and successes they have had and to collectively envision and establish goals for the future. These workshops were video recorded, and fully transcribed.

Survey Design

The survey was further developed using questions and scales adapted for this context from López-Carr's survey in the Mayan Biosphere Reserve (2008), and from insights from Lee's (2010) interview guides and findings with Nicaraguan migrants in a neighboring district. The face-to-face survey interview typically lasted one hour and utilized the ethno-survey method developed by Massey and Zenteno (2000). Between my field assistant and me, one person administered the survey and recorded the responses on a code sheet while the other recorded direct quotes, responses to open ended questions, and made informal observations to give context and strengthen interpretation of the survey responses. This process allowed both qualitative and quantitative data to be collected during the interviews and each survey is complemented with qualitative description and quotes. The survey included 4 major thematic sections addressing the following: 1) socio-economic/demographic 2) land 3) migration histories and motivations and 4) environmental perceptions.

Survey Sampling

Three focal villages were selected. The villages represent a gradient³ of economic development, a gradient of forest cover and a gradient of extension of pineapple cultivation,

³ I completed this disciplinary research as a member of an interdisciplinary team. For these reason villages were selected based on an interdisciplinary criterion that was concerned with questions of agricultural land use effects on biodiversity conservation. Villages were selected across a gradient of forest cover and were representative of dominant agricultural land uses but also represented social variation.

which was used as a proxy for agricultural modernization or indicator of capitalist penetration. El Roble, the most populated village, has the lowest forest cover (38%) and the largest amount of hectares in pineapple cultivation. Pangola, has moderate levels of each factor, and Boca Tapada, is very close to the Nicaraguan border, very rural, has largely intact forest cover (67%) and pineapple cultivation has just started to expand. Households were identified with aerial photos and handmade maps, were assigned random numbers and randomly sampled. I sampled 6% of the El Roble region, 23% of Boca Tapada and 22% of Pangola. Almost 10% of the households within the three focal villages were sampled.

Interviews

In addition to the randomly selected households that participated in the survey, I conducted thirty-five semi-structured interviews. Participants in our sample were purposively selected to include a wide range of individuals: representatives of agricultural producers' organizations, large landholders, and regional and national agricultural government officials. Interviews lasted between 1-2 hours and were conducted in both Spanish and English. The interviews were digitally voice-recorded and fully transcribed. Workshop and interview transcripts were coded in ATLAS Ti 7 into thematic categories. Each transcript underwent two rounds of coding, the first being preliminary and raw coding, based on sensitizing concepts (migration, agrarian reform, and the community development process, socio-economic mobility etc.). Preliminary coding also captured in situ (not predetermined) codes that arise directly from the participant's speech. This first round is done quickly and bins quotes into large themes. The second round of coding was more focused and conducted line by line to unpack the sensitizing concepts into sub categories and capture a more in depth interpretation of the

range and variability within each theme (for a full discussion of this method see Charmaz 2014). Demonstrative quotes were selected to illustrate major themes and the range of perspectives within each theme.

Statistical Analysis

Dependent continuous variables (i.e. age, duration, income, land holdings, assets, dependents, education of female, number of people living in house, urban/rural migrant) were tested with standard one-way ANOVA and Welch's robust ANOVA test. These tests were used to test differences among migrant types and life cycle stages targeted at the following questions: 1) Are there differences in household characteristics among migrant types? and 2) Are there differences in social wellbeing indicators among life cycle stages? Tukey multiple comparison tests were used to examine group differences only when both the parametric and robust tests were significant for the continuous variables. To measure levels of association between categorical variables (i.e. dominant economic activity that generates income, literate/illiterate, family structure) Pearson chi squared tests were conducted. If expected cell counts were low, exact tests were performed. The significance value used was $\alpha = .05$.

Results

Migrant Flows And Types

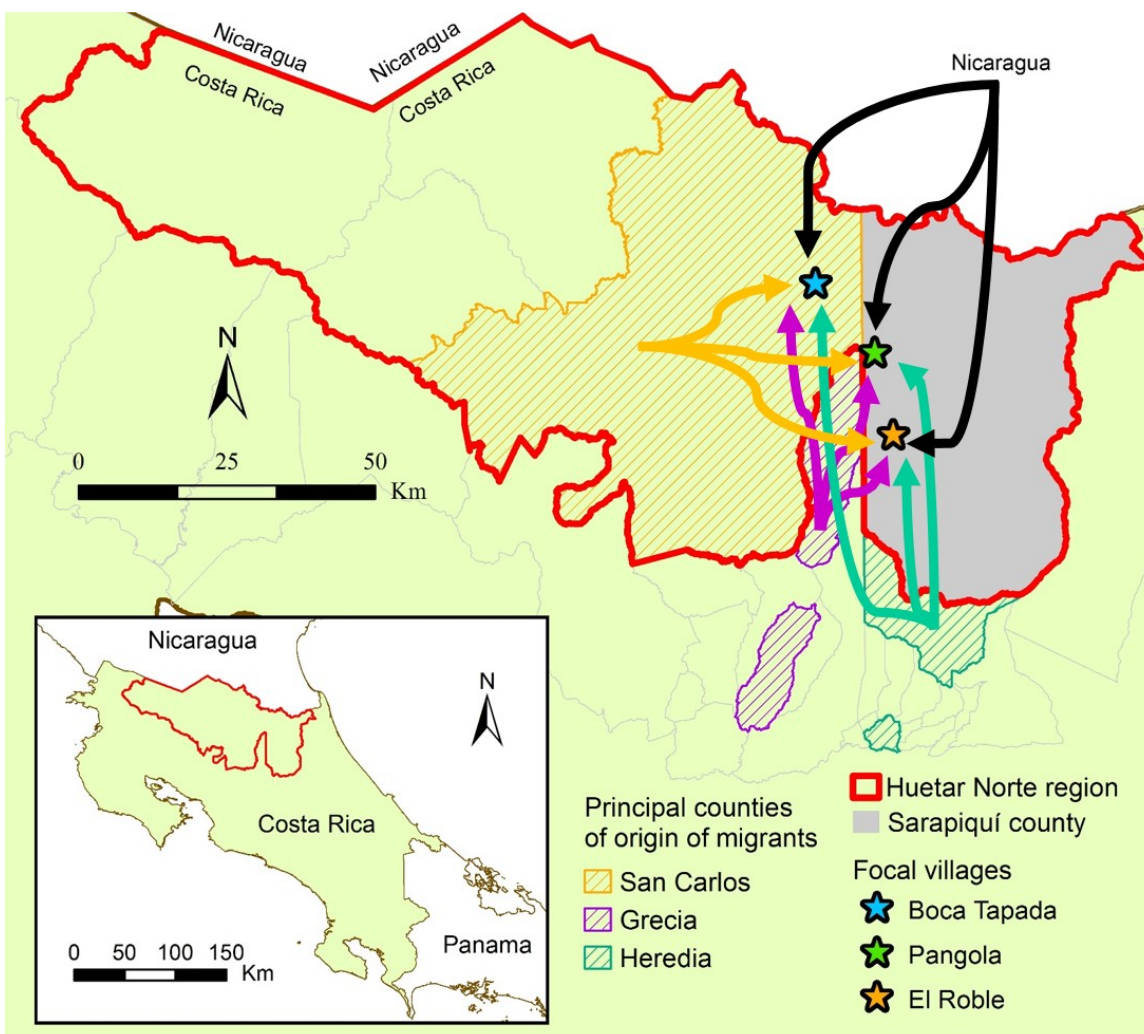
ANOVA analysis revealed that migrants to this region have come in waves defined by year of arrival to the region and their principal purpose for migrating. The first wave of migrants came between 20-35 years ago or between the years of 1980-1995, and the second wave came in the past 10-15 years or since the year 2000. The first wave is comprised of Nicaraguan

refugees seeking political asylum and migrants seeking land. The second wave is comprised of migrants seeking employment, cheaper housing, or environmental amenities. Important differences exist between each migrant type related to their principal motivation for coming here, their age, duration, or length of time living in the region, and how they earn their living. First, we describe general characteristics of migrants and examine differences between migrant types. Second, we will describe how the two main migrant waves coincide with major historic events in the frontier; migrants motivated by land were tied to state sponsored settlement of the frontier and the establishment of colonies, while migrants motivated by labor were tied to the expansion of non-traditional export agriculture, predominantly of pineapple. Finally, we will examine characteristics of the Nicaraguan migrant population to demonstrate the differences between undocumented and documented migrants, and the unique opportunities and constraints they face in comparison to Costa Rican migrants.

Migrant Origins

Of the 138 households sampled, 83%, or 115 households, were not born in this region and are therefore classified as not native to this region. The majority of these migrants, with the exception of Nicaraguan households, have never migrated before or since migrating to the frontier. This limited migration experience is common for Costa Ricans and has been found in other studies (Sana and Massey 2005). In general, internal and international migrants have lived in the study region for an average of 12 years.

Figure 2: Major Internal and International Migration Flows to Focal Villages in San Carlos and Sarapiquí Counties



Forty three percent of all migrants (both internal and international) are from rural regions and 57% are from urban regions. Heredia, San Carlos and Grecia counties are the principal sending regions for internal migrants (Figure 1). Heredia is the most urban, with 1percent of the population involved in the primary sector, or agricultural sector (Estado de la Nación 2012). Grecia is also a predominantly urban county with 16 percent of the population engaged in the primary sector (Estado de la Nación 2012). San Carlos is both a sending and receiving

region where most migrants came from the more urban parts of that county and migrated North. Significant proportions of the populations in Sarapiquí and San Carlos participate in the primary sector (26% and 48% respectively) (Estado de la Nación 2012). These receiving counties are predominantly rural and have a higher number of households that cannot meet their basic needs when compared to Grecia and Hereida (Estado de la Nación 2012). Urbanization and the proportion of participation in the primary sector of the economy are often good indicators of peripheral economies, as evidenced in Sarapiquí and San Carlos counties (Estado de la Nación and INEC 2012). The differences between sending and receiving counties in regards to degrees of incorporation (as indicated by urbanization and percentage of participation in the primary sector) likely motivates migrants to move between them depending on their objectives (Hamilton and Chinchilla 1991). This same difference exists, but in reverse for international migrants from Nicaragua who seek the frontier because it is better economically than Nicaragua (Lundquist and Massey 2005) but also more accessible in regards to housing and low skilled employment than other regions of Costa Rica (Estado de la Nación and INEC 2012).

Differences Among Migrant Types

Table 2 presents characteristics of migrants within each migrant type and highlights the distribution across migrant types of several of the dependent variables tested in Table 3. Table 3 presents the results of the ANOVA analysis where the means of each dependent variable were compared across migrant types and displays both parametric and robust p values. The only statistically significant variable differences in the ANOVA tests among migrant types, where both parametric and robust tests agree, are the differences in the duration of residence

on the frontier and current age (Table 3). Urban migrant, rural migrant and the square root of landholdings are significant in just the robust test but not the parametric test.

Cross-tabular analyses show that migrant types also differ by the economic activity that produces their principal income (i.e. farm or livestock, transfers (i.e. welfare, pension), non-farm labor and farm wage labor) ($p = .01$). Migrants motivated by work opportunities account for 50% of the sample who earn their income from farm wage labor, indicating that the majority of them are migrating for and securing jobs in that sector consistent with regional growth in the export agriculture sector. Land migrants account for 67% of the sample that earn their income from farming or livestock.

Cross tabular analysis of migrant types by household life cycle stage ($p = .04$), demonstrates that half of work migrants are young households and that two-thirds of both amenity and land migrants are mature households.

Land is a principal pull to the frontier and social ties appear to not be a differentiating characteristic among migrants. Although 25 percent of migrants had land in their origin and became landowners again in Sarapiquí, 40 percent of all migrants became first time landowners upon moving to the frontier (Table 2). Although median landholdings differ among migrant types, these differences do not test significant across migrant types. Just under half of the migrants, or 53 households, migrated here with social ties (Table 2). There is no significant difference (Table 3) among migrants based on whether or not they had social ties to the region, indicating that migration flows are not selective by social ties. Furthermore,

two-thirds of migrants with social ties had weak social ties, defined as non-nuclear or extended family members, friends or acquaintances.

Table 2: Migrant Types Categorized By Household Characteristics

| <i>Migrant Type</i> <i>N = 115</i> | <i>Land Acquisition</i> <i>(First Wave)</i> | <i>Refugee</i> <i>(First Wave)</i> | <i>Work</i> <i>(Second Wave)</i> | <i>Housing</i> <i>(Second Wave)</i> | <i>Amenity</i> <i>(Second Wave)</i> |
|--|--|---------------------------------------|-------------------------------------|--|--|
| Frequency | 30 | 8 | 37 | 28 | 12 |
| Age (Mean) | 53 | 44 | 43 | 45 | 60 |
| Age Range | 24-74 | 34-55 | 18-69 | 20-76 | 33-102 |
| Duration (Mean years) | 20.2 | 26.12 | 10.8 | 12.2 | 12.7 |
| Duration Range | 2-52 | 8-37 | 2-34 | 2-41 | 2-44 |
| Percentage of migrant type that is Nicaraguan | 17 | 100 | 46 | 17 | 4 |
| Median Monthly Income (USD) | 244 | 311 | 325 | 212 | 469 |
| Income Range | 0-797.00 | 93.00-445 | 46- 1,854 | 37-2,002.00 | 0-2,781 |
| Land Holdings (Median) | 6 | .02 | .06 | .06 | .46 |
| Urban Migrant (out of 1) | .56 | .12 | .59 | .60 | .67 |
| Rural Migrant | .44 | .88 | .41 | .40 | .33 |
| Assets (Median) | 9 | 8 | 9 | 9 | 10 |

Table 3: Statistical Differences Between First Wave and Second Wave Migrants

| <i>Dependent Variables</i> | <i>Parametric</i> | <i>Robust</i> |
|-------------------------------|-------------------|---------------|
| Duration of residence** | .000 | .001 |
| Age** | .002 | .004 |
| Assets | .476 | .525 |
| Land Ownership in origin | .353 | .448 |
| Social Ties (Yes/No) | .402 | .422 |
| Urban immigrant * | .130 | .031 |
| Rural immigrant* | .130 | .031 |
| Square root of Land holdings* | .247 | .000 |
| Square root of Income | .171 | .255 |

* p value <.05 for either parametric and robust tests

** p value <.05 for both parametric and robust tests

The fact that migrant type differ significantly by duration and age supports the notion that as frontiers develop they become amalgamations of different population cohorts that are motivated to migrate for different reasons and likely exhibit different demographic and socioeconomic characteristics (Barbier 2012). Given that there are clear delineations in the population based on age group, duration and migrant type, this finding supports the analysis of quality of life as a function of life cycle stage, as described in the quality of life section.

Characterization of Migrant Groups

First Wave Migrants: The Land Seekers

Tables 4 and 5 summarize selected surveyed migrants and purposively sampled interviewees whose quotes and stories are told in the following sections.

Table 4: Selected Migrant Profiles

| <i>Name</i> | <i>Job</i> | <i>Age</i> | <i>Motivation for migration</i> | <i>Year of arrival</i> |
|-------------|----------------------|------------|---------------------------------|------------------------|
| Diego | Pineapple field hand | 43 | Refugee | 1996 |
| Sergio | Pineapple field hand | 51 | Refugee | 1985 |
| Luis | Caretaker | 23 | Work | 2011 |

Table 5: Purposively Sampled Interviewees

| <i>Name</i> | <i>Position</i> | <i>Migrant</i> |
|-------------|--|----------------|
| Isa | Vice president of Association of Development (IDA colony) | Yes |
| Brian | Scientist, Community Organizer for Conservation | No |
| Maria | Community leader (IDA colony) | Yes |
| Carlos | IDA representative | No |
| Arturo | President of the Association of Development (IDA colony) | Yes |
| Martis | Community Leader (Pineapple Town) | Yes |

Land migrants were typically poor upon arrival to the frontier and have not seen increases in income. Although they acquired land and gained symbolic status by transitioning from agricultural laborers to landowners, they remain in the lower median income level for migrants (Table 3). The following quote from Isa, the vice president of the Rural Development Association in one of the focal villages, and an early land migrant who was involved in organizing squatters to establish her village, demonstrates how she experienced this type of mobility.

The change that we wanted, we did ourselves, to no longer be manual laborers, to have a piece of land where we can grow something, at least, what one eats and to leave it [the land] for the children too, so that they don't have to become manual laborers.

Isa continues to describe how they came here in two steps, with the men coming first, and what this region looked like to these early migrants in the following quote:

It was completely forested. There was not one resource, not water, not electricity, no doctors, no church, no school. It was completely forested. We were uprooted. We were squatters. We were out on the streets with the kids. We came from San Carlos to here. When we arrived at this time, my husband migrated first because it was all forest, and there was nothing, so the men came first.

These quotes demonstrate a repeated perception in the qualitative data that describes how remote this region was and how basic services were lacking for early migrants. This situation, together with the pitfalls of the national agrarian reform program, led to outmigration of many of these early migrants who could not cope with the lack of resources, poor agricultural land, and risk on the frontier (as described in Seligson 1979). Some villages were markedly different from others, as there had been obvious turnover of early frontier migrants. These villages reveal early migrant failure; speculative land investment and migrant turnover were common trends especially in the more remote IDA villages and resulted in severe land concentration among a small number of individuals. The following quote demonstrates this trend in the northernmost part of the study region that is the most forested and remote. A regional conservation expert commissioned a land tenure study to test the viability of purchasing the northern portion of the study region, called Maquenque, for conservation. In the following quote, he explains how study findings show that land in that region had

originally been redistributed to small landholders and now is almost entirely owned by a few large landholders, the majority of whom do not live in this region.

There are more or less than 850 landowners in Maquenque so the majority of the farms are more than 120 hectares and go up to 300, 400, or 500 hectares. About 95% of those landholders today are people who live away from here. But all of this land was IDA colonies, that was [used] to foment colonization in the 1970s and 1980s. [They were established] for people to come to this region, to cut some forest and to grow something but it didn't work, so they left and when the mortgage expired, they sold. Some migrants bought up all their neighbors, so that now there are four or five property owners who have these big farms that legally is impossible because IDA gave land to *small farmers* for agricultural activities, not for forestry or to sell or for profit.

Median landholdings among sampled migrants are 7.3 hectares and typical IDA plots typically range from 6-20 hectares. The size of the landholdings described in the above quote demonstrates how extreme land consolidation has been in this area. This scenario is common in many of the most remote IDA settlements and has significant social implications. In the following quote, Maria, a community leader in one of the more remote IDA settlements, describes that this same trend has occurred in her community,

My little community is twenty two years old, it began in 1990, when [that] ranch was bought by the government to help low income families and give them a piece of land, in order for each person to succeed and have a place to live. But when the government provided these lands, all of this land was covered by forest, and pasture. There were

lots of trees. [The government] gave everyone a piece of private land and they had to delineate it and clear it. There was no electricity and no potable water. There were only a few houses. My house was made of sugarcane and bamboo and had a dirt floor. There were no roads either. We walked through the pasture with the grass as high up to our knees. The government provided these lands, to have the people exploit it, and grow crops. But now, the original owners are not here anymore because the help that the government gave us was not beneficial, there were no [agricultural] earnings, everyone began to sell and they left. There are very few remaining; those who stayed, stayed because they chose to work harder, and they said I'm going to make it with this.

It is clear how underdeveloped this region was in regard to roads and basic infrastructure or services in 1990, although fairly recent in modern history. The lack of these critical structural factors contributed to the trend of outmigration after early initial settlement. When Carlos, a government representative for IDA who was involved in the land distribution and establishment of these colonies, described this wave of outmigration from IDA colonies, he attributed it to poor conception and shortfalls in the full implementation of the agrarian reform project. In his words,

This is part of the problem in these communities, and with our small producers, because the criteria for land distribution was not the best, I think, maybe we distributed land that never should have been distributed because it was not [ecologically] apt or because there were not the [financial] conditions for infrastructural development, or organizations for financing it, to strengthen the

distribution of land and ensure that it was profitable, or sustainable.

Maria and Carlos described experiences in remote villages characterized by high smallholder abandonment and outmigration, although some IDA settlements are more populated and prosperous. These experiences in remote villages demonstrate the assumptions posed in the hollow frontier hypothesis. This hypothesis associates declining returns from agriculture to land abandonment and turnover, as well as declines in population, rather than to persistence of populations and agricultural intensification or economic diversification. Arturo, the president of the Rural Development Association for a remote IDA colony, paints a picture of how this hollow frontier looks to people who remain in these remote villages:

More than 50% [of the landowners here] are not the original settlers; they are not the original landowners. The majority does not live here; they live somewhere else, and come here for vacation. They have day laborers that live on the farm take care of their parcels. So, of the settlers that originally came here to get land, there are 15 or so, but no more than that.

These new landowners, who are not the original settlers of these government colonies, are primarily temporary amenity migrants from urban areas and not permanent residents. They are part of the second wave of migrants to this region.

Second Wave Migrants: Labor Seekers

Work migrants' duration in this region (Table 2) parallels the expansion of pineapple, which has increased from a total of 483 ha. to 22139 ha. from 1986 to 2011, with most growth

occurring in the past 15 years (Shaver et al. 2014). Pineapple plantations are a major employer in this region and in some cases were the foundation of the formation of the village. Gerardo, an agronomist and manager of one of the largest and oldest pineapple plantations in the region, described how these companies invest in peripheral regions and provide critical basic infrastructure to these remote towns. In his words,

This type of business always brings development. This was one of those towns that until recently, the road was not paved, and there were big potholes, now, at least we can drive around the village easily. We provide a bus to pick up the kids to study and take them to high school, to the hospital, or to the bank. [We provide] these types of services that people need daily so yeah, it [this business] has brought development.

Others might say that it brings poverty, but no, [I don't think so]. If it had not been for these companies, the people here would have to get around on horses.

This investment and the labor demand pull migrants to these villages. Martis, a community leader from Pangola, which has become a pineapple company town, described how pineapple farms have drawn people seeking employment to this region. In her words,

I remember when we came here; there was Tarena, the first exporter of pineapple in the Northern zone. Before that it was small cattle farms that they united to make 3000-5000 hectares to grow pineapple. Colombians, Americans, and Guatemalans began to come in and buy land to grow pineapple for export. This pineapple farm made Pangola do a 180-degree turn, because it demanded a lot, a lot of labor. Before, Pangola had a specific number of inhabitants and when Tarena began people began to migrate here to work in the pineapple farm.

Gerardo who manages this pineapple farm now for a Guatemalan company, confirms his observation of the increased demand for labor:

The big rancher that was here before had about 400 hectares of pasture with more or less than 300 cows; to manage 300 cows you need about 3 people... Pineapple requires about 1 person for every 2 hectares.

Due to the limited employment options beyond pineapple, most residents feel economic dependency on the big pineapple companies, despite the negative ecological or social consequences. As Martis explained,

These pineapple farms are a necessary evil. They are bad [ecologically] but necessary for people to eat, because it maintains so many families. This is how families get money to maintain themselves.

The demand for low skilled agricultural laborers in pineapple coincides with Nicaraguan migration to this region, as Nicaraguans represent 60% of the labor force in pineapple cultivation, packing and processing and this region accounts for over 50% of the national land area in pineapple (Lee 2010). The influx of Nicaraguans seeking employment is changing the demographic composition of these towns as Martis explained:

Here the majority of people are Nicaraguan, in the pineapple farms, you see Costa Ricans as well but the majority of people that came were Nicaraguans, it is Nicaraguan labor. Before it wasn't; it was Ticos [the colloquial name for Costa Ricans].

Nicaraguan Migrants

Nicaraguan migrants are represented in the two major waves of migrants described above, but have some distinct differences that are important to highlight. First wave migrants are mostly documented refugees, initially politically motivated international migrants who later internally migrated to the frontier for land and employment. Second wave migrants are motivated by employment opportunities and represent a higher prevalence of migrants with undocumented immigration status. Qualitative and quantitative responses in the surveys indicated that these two groups of migrants are differentiated by their socio-economic mobility related to landholdings and ability to participate in the formal economy. Refugees typically had significant landholdings in Nicaragua that were lost prior to migrating and saw declines in quality of life until coming to the frontier where land acquisition and ownership became a possibility again. While the majority of documented immigrants are refugees and typically employed in pineapple farms, most undocumented immigrants are caretakers of large farms or participate in less regulated agricultural sectors. These findings are congruent with the findings of Lee (2010), where migrants were differentiated in their labor opportunities within the agricultural sector due to their immigration status.

Table 6: Characteristics of Nicaraguan Migrants (N= 35)

| | |
|------------------------------|---|
| Duration (Mean Years) | Refugee: 26, Work: 11 |
| Intend to stay in Costa Rica | 75% |
| Documented | 59% |
| Undocumented | 41% |
| Have family in Nicaragua | 31/35 households, 97% |
| Send Remittances | 10 households (\$18.00-180.00 infrequently) |
| Major employment sectors | Pineapple: 34%, Caretakers: 20% |

Two migrant types, work and refugee, account for 75% percent of all Nicaraguan migrants (Table 2). First wave Nicaraguan migrants, the refugees, initially migrated to other regions in Costa Rica as political migrants or refugees and have since migrated to the frontier as economic migrants, finding higher paid, year round work in export agriculture and opportunities to acquire land. Refugees in particular have seen decreases in material wealth due to the loss of major landholdings when they fled during the Contra War. Ten respondents had land in Nicaragua before migrating, with a median of 18 hectares. These migrants would have preferred to stay in Nicaragua had it not been for the war and experienced a decrease in the quality of life upon migrating to Costa Rica. For example, Diego fled Nicaragua in 1996. He was a farmer in Nicaragua with 40 hectares of land, but now rents a half-hectare with only a house and a small yard. Diego's first job in Costa Rica was at a meat processing plant near the border, then he worked as a caretaker for a big cattle ranch in San Carlos, and now he works at a pineapple plantation. When asked about his current standard of living, Diego answered:

It's hard, everything is hard, principally, the fact that we don't have land. It is worse here. Without land you work every day just to pay for water and electricity. There [in Nicaragua] we grew crops, and we had our own land and our own house.

Even though Diego said he would like to return to Nicaragua, he said he would have to give up his pension he accumulated from all the years he has worked in Costa Rica. Plus, the government seized his land in Nicaragua and he doesn't have enough money to buy land again.

For some, migration to the frontier has allowed them to earn surplus income, helping them purchase land in Costa Rica or Nicaragua, an option that had previously been out of reach since migrating to Costa Rica. Fifty percent of sampled Nicaraguan households own land in Costa Rica and fifty percent pay rent or work as caretakers for land. Sixteen percent of Nicaraguan households that had land in their country of origin have land in this region and 32% are first time landholders. This region has become one place where Nicaraguans can acquire land for the first time, as Carlos, a representative of IDA explains the flow of land seeking Nicaraguans to this region:

It was in 1990 onwards, after the war in Nicaragua, when the exodus began, and there were a ton of Nicaraguans with legal residency. So they came [to IDA] and asked for land. Because these people didn't have this opportunity in their country, and they come here and they found it [land].

Sergio, has been in Costa Rica for 30 years, and claims he would have stayed in Nicaragua, if not for the war. He had 50 hectares there and used to grow cassava, beans, and corn. He and his family migrated in 2006 from Juan Viñas and Turrialba, both sugarcane and coffee-producing regions in central Costa Rica, to the study region. There he worked, *cosechas* (the harvests) or *trabajo de temporada* (seasonal work) and rented a house. He recommended residing in this region of Costa Rica compared to the coffee and sugarcane regions because “there is secure employment and you can maintain your family.” Due to his status as a legal resident, he was able to take out a loan to purchase a piece of land and has been able to pay off all but \$542 from combining his earnings as a field hand at a big pineapple farm with contributions from his daughter's salary totaling \$325 per month.

Except for some of the above cases when an individual owned a farm in Nicaragua, all Nicaraguan migrants have generally seen improvements in wages and job security since settling in Costa Rica. Wages have increased even for those who owned farms in Nicaragua, but their autonomy and material assets have decreased overall since migrating from Nicaragua. Typically, Nicaraguan migrants start with temporary or seasonal work in Costa Rica as manual laborers in lower paid, often informal, off-the-books opportunities in agricultural sectors like coffee or sugar cane. However, jobs on the frontier, principally in pineapple, present higher paid but still low skilled employment and provide a space for upward economic mobility of documented Nicaraguan migrants. However, undocumented migrants often experience less mobility and are constrained to informal sectors of the economy even on the frontier. The best example of this dynamic is caretaking of absentee owned farms for large Costa Rican landholders.

Caretaking is a profession that is particularly productive for younger, undocumented immigrants and established Nicaraguans in more isolated regions. For example, Luis a 23-year-old single male caretaker manages an 85 hectares cassava plantation for wealthy Costa Ricans who own a packing and processing plant in a nearby city. They pay him a monthly salary of \$361 to maintain the farm, provide him with housing and pay for his utilities. He says this is three times more than he could make in Nicaragua. He first migrated to Costa Rica when he was eleven years old with his mom, who now lives in Costa Rica, and his father remains in Nicaragua. Since adolescence he has frequently migrated to Costa Rica for work, but he remains undocumented and has to continually return to Nicaragua. He is a recent

migrant and has been in this region since 2011. He would recommend this area because, “There is work and it’s away from everything, without problems”. Caretaking, as an employment sector, is related to the land turnover in many of the more remote regions and the partial failure of agrarian reform where there has been a concentration of land and high prevalence of absentee ownership (Morse et al. 2009, Schelhas and Sanchez-Azofeifa 2006). However, these cases demonstrate that this failure has provided a livelihood for some undocumented migrants who would otherwise be excluded from the major employment sector on the frontier --export agriculture.

Lifecycle Stages and Migrant Quality of Life on the Frontier

Migrants were asked to evaluate if their life had improved upon settling here. Ninety-four respondents (or 82% of the sample) affirmed that their lives had improved. Half of the migrants in the survey sample felt their life had tangibly improved, most often attributed to land acquisition, employment, or improvements in the quality of life (i.e., rural lifestyle, security, health, natural environment). Another 32% felt their lives have been stable, with ups and downs, but with no real obvious gains in quality of life. The remaining 18% felt their quality of life had declined due to decreases in income, loss of land, unemployment or family issues. Self-evaluation of quality of life and mobility post-migration are highly variable across households, as migrant quality of life is a dynamic process that changes over time. At the same time, it is possible to trace patterns in migrant quality of life that are related to the current lifecycle stage of households.

The life cycle stage of households is used in this analysis because it is a significant umbrella factor in describing differences in the quality of life and economic decision making of populations in other frontier regions across Latin America (Walker et al. 2002, Marquette 2006, de Sherbinin et al. 2008). Since migrating to the frontier is such a risky household decision, and is generally selective for lower income populations, assessment of the quality of life is a critical component of understanding whether migration has led to upward mobility of these populations or if they remain on the margins socio-economically. It is also important in determining whether the social, economic and ecological context frontier is able to provide a minimum quality of life, and how migrant wellbeing could be improved. Key dependent variables analyzed to identify differences among life cycle stages are displayed in Table 7.

Table 7. Migrant Household Characteristics by Life Cycle Stage

| <i>Life Cycle Stage (age of household head in years)</i> | <i>Young >30</i> | <i>Maturing 31-50</i> | <i>Mature 50+</i> |
|---|---------------------|-----------------------|-------------------|
| Frequency (N=115) | 15 | 53 | 47 |
| Age (mean) | 25 | 42 | 63 |
| Duration Here (Mean Years) | 6 | 14 | 18 |
| Duration Range | 2-20 | 2-42 | 2-52 |
| Assets (Median) (Range 0-14) | 9 (6-13) | 9 (4-12) | 8 (3-12) |
| Monthly Median Income (USD) | 354 | 334 | 217 |
| Income Range | 93-1,854 | 0-2,781 | 0-2,039 |
| Education of Female (Range 0-4, 1: no education, 2: primary, 3: secondary, 4: post secondary) | 1.7 | 1.1 | .91 |

| | | | |
|--|------|-----|------|
| Number of people currently living in house (Mean) | 3 | 4 | 3 |
| Range of people living in house | 1-5 | 1-9 | 1-11 |
| Number of dependents (Mean) | 1 | 2 | 1 |
| Total number of children | 1 | 3 | 6 |
| Range of Children | 0-3 | 0-8 | 0-13 |
| Total Land Holdings (Median ha.) | .015 | .06 | 1 |

Table 8: Differences in Quality of Life Variables Among Young and Mature Households

| <i>Dependent Variables</i> | <i>Parametric</i> | <i>Robust</i> |
|--|-------------------|---------------|
| Duration of residence** | .002 | .000 |
| Total Number of Kids** | .000 | .000 |
| Total Number of Dependents* | .097 | .017 |
| Number of people currently living in the house** | .008 | .000 |
| Education of Female** | .020 | .026 |
| Education of Male | .095 | .109 |
| Assets** | .006 | .009 |
| Land holdings (square root transformed) | .120 | .156 |
| Income**(square root transformed) | .040 | .043 |

* p value >.05 for either parametric or robust tests

**p value >.05 for both parametric and robust tests

Table 8 shows if there were significant differences among dependent variables between young and mature life cycle stage categories using ANOVA parametric and robust tests and displays the p value for each test. The mean and median values of the dependent variables that were tested across the life cycle stages are presented in Table 7. In the ANOVA tests, young households and mature households are the most different and the following variables were

significantly different between those two life cycle stages: duration, total number of kids, number of people living in the house, education of female, assets, and square root of income (Table 8). Cross-tabular analysis demonstrated that differences in literacy measured as a binary variable literate or not (p value = .01) and family structure (i.e. single, married, divorced, widowed) (p value = .01) were also significant across life cycle stages.

It is clear that population cohorts that arrived on the frontier at different times have a different suite of characteristics related to differences in quality of life (Table 7). Mature households have generally been in the Sarapiquí region longer, have the lowest income and asset endowments, were the most fertile, and still have a high number of dependents and people living in their home. A higher proportion of this cohort is illiterate, and often are in less secure family structures (i.e., divorced, or widowed). They also have the most land holdings, and although this can be an indicator of wealth, in this case it is not if you look at their lower median income in comparison to the other life cycle stages.

Instead, young households whom are the most recent migrants are faring better. They have higher incomes and the fewest dependents, children, and people living in their households indicating that they have less mouths to feed (Table 7). Young households also have the highest level of female education.

Maturing households have the highest number of dependents and people in the home. Their income level is between young and mature households, however, due to the greater number of dependents, their economic situation may be less stable. No variables tested produced a

significant difference when comparing the means of maturing households to mature or to young households hence just the p values for the comparison of mature and young households in Table 8.

Despite variation among the different life cycle stages all of these households economically are within the low range compared to national income levels. The median monthly income is \$290 for all migrant households which when compared to national standards, is in the third lowest decile of monthly household income in 2012 and is equivalent to the average monthly salary for people in the agricultural sector, or primary sector, which is the lowest paid sector of the economy (Estado de la Nación and INEC 2012). This low median income speaks to the marginal socioeconomic status of the majority of frontier migrants. We have highlighted economic and demographic variables that are related to quality of life and have shown that the youngest households are doing the best based on that criteria. However, most migrants said their life had improved and often cited non-economic factors that had improved such as health, the quality of the environment, or landownership.

Discussion

The purpose of this study was to describe migration dynamics on the Costa Rican frontier and explore differences among migrants in their quality of life and mobility post migration. My findings demonstrate there have been distinct migrant flows of different migrant types to the frontier differentiated by the purpose of migration, duration on the frontier, and the migrant's current age. Major migration waves coincide with historical events—the contra war, agrarian reform and the pineapple boom.

Within each young, maturing and mature lifecycle stages there are examples of households that have higher measures of quality of life and ones that are challenged due to structural (i.e. geographic remoteness, local economic or employment opportunities) and more personal factors within households (i.e. health related issues, limited male labor). Research in other frontiers typically finds young households, experience the most precarious situations on the frontier since they are supporting young dependents and they are in the process of building economic resources in the context of the limited employment opportunities in the frontier (Marquette 2006). Younger households, in our study site, however, are faring better than maturing or mature households. Young households, who are recent migrants, show higher mean average values for quality of life variables than mature households that are more land rich and have been on the frontier longer. However, 50 percent of work migrants are young households which links them to the pineapple boom and likely links their quality of life, at least economically to the success of that industry. As Barbier warns, the frontier is characterized by boom and bust cycles and sustained commodity booms are often difficult to accomplish (Barbier 2012) which makes the future uncertain for pineapple and young households whose economic security is tied to that industry.

Longer duration on the frontier is usually correlated with a higher quality of life because it is assumed that time is an important factor in accumulating resources, becoming established and stabilizing on the frontier (Marquette 2006). However in this sample, the households that have been here the longest, mature households, are also among the poorest (Table 6). This situation indicates the effects of negative path dependency on migrant households' quality of life (Caviglia-Harris et al. 2013), as early land migrants were typically poor and appear to

remain poor despite land acquisition. Land is one of the most prominent resources on the frontier and in this case was made even more accessible to low income populations through government sponsored settlement; this early accessibility and selectivity for households with low socioeconomic status maybe minimizes the potential wealth creating benefits of early arrival on the frontier and early land acquisition in this region. Furthermore, the uneven development of viable agricultural production and infrastructure in these settlements explains the stagnating and challenged status for the majority of mature households with land (Schelhas and Sanchez-Azofeifa 2006).

This frontier is unique in that it has undergone a forest transition, where a trend of deforestation has slowed and forest cover is increasing, despite consistent population growth due to the 1996 Forestry Law of Costa Rica (Morse et al. 2009). The high prevalence of absentee land ownership, declining rural population of some of these IDA colonies and land consolidation, I argue, resembles what Schelhas and Sanchez-Azofeifa (2006) call a hollow frontier. Absentee ownership is substantial (Morse et al. 2009) and land consolidation has been a continuous trend in this region beginning with speculative land investing and high turnover of early migrants especially in IDA settlements (Butterfield 1994, Schelhas and Sanchez-Azofeifa 2006) and then continuing with the land grabbing associated with the expansion of pineapple in the past ten years (Shaver et al. 2014). Moreover, the range of non-land reasons to migrate to this region and prevalence of amenity attributes in why migrants would recommend this region also indicate recent migrants are motivated more by economic opportunities and quality of life reasons which is consistent with several other studies looking at older frontiers (Jepson 2006, Barbier 2012) or frontiers that have undergone rural

restructuring, spelling the end of an agrarian based economy (Gosnell and Abrams 2011). However, continued overall population growth and the increasing trend of agricultural intensification in pineapple with its associated labor demand challenge the characterization of a hollow frontier.

Instead, this frontier is aging; shifting from smallholder to commercial agriculture but still is dominated by the primary sector as it is becoming more and more incorporated into the national and global economy. Since political economic restructuring of the agricultural sector in the 1980s and as pineapple production has grown substantially in this region, now accounting for just over half of the area cultivated in pineapple nationally, farm wage and off farm labor has increased, and small farm ownership has decreased (Rodriquez and Avnedaño 2005). Our data indicate that the majority of families (92%) receive their principal income from off farm or farm wage labor activities. This validates the trajectory of frontiers is to become increasingly incorporated into the capitalist economy, leading to land consolidation predicated on the loss of smallholder properties and farm based livelihoods and land use conversion of subsistence crops to non-traditional export agricultural crops, like pineapple (Browder et al. 2008). However, the high prevalence of lower socio-economic measures of migrant quality of life compared to the rest of Costa Rica or neighboring counties and the heavy proportion of residents participating in the primary sector indicate that the degree of penetration of and integration into the capitalist economy is uneven and thus quality of life outcomes are uneven among frontier migrants. And clearly, some lifecycle population cohorts and migrant types, notably mature households and land migrants, still remain on the periphery.

Conclusion

This research illustrates the uniqueness of frontier migrant pathways and motivations and outlines the differences among migrant households on the frontier. Through the descriptions of the convergences between historical events and migration waves to the frontier, it is clear that the process of incorporation of the periphery is uneven and cyclical and not a terminal process but rather is one that provides both opportunities and barriers for different types of households across time. This situation has resulted in uneven development across the frontier landscape that is represented in the differences among migrant households and internal and international migrants, and helps explain the abandoned IDA settlements, and land consolidation trends. This frontier is aging but continued migration indicates the frontier, as a social, ecological and political process, continues and that its future development trajectory is still uncertain.

This research was exploratory and was intended to provide a fundamental description of who migrates to the frontier, why they migrate and how they are doing. Future frontier migration research would be vastly improved with longitudinal studies of the dynamic process of migrant quality of life and livelihood formation on the frontier.

References

- Augelli, J. 1987. "Costa Rica's Frontier Legacy." *Geographical Review* 77 (1): 1–16.
- Barbier, E. B. 2012. "Scarcity, Frontiers and Development." *The Geographical Journal* 178 (2): 110–122.
- Browder, J. O., M. Pedlowski, R. Walker, R. H. Wynne, P. M. Summers, A. Abad, N. Becerra-Cordoba, and J. Mil-Homens. 2008. "Revisiting Theories of Frontier Expansion in the Brazilian Amazon: A Survey of the Colonist Farming Population in Rondônia's Post-Frontier, 1992–2002." *World Development* 36 (8): 1469–1492.
- Brockett, C. 1998. *Land, power, and poverty: agrarian transformation and political conflict in Central America*. Boulder: Westview Press.
- Bush, C. 2005. "Reconsidering Incorporation: Uneven Histories of Capitalist Expansion and Encroachment Native America". *Studies in Political Economy* 76:83-109
- Butterfield, R. P. 1994. "The Regional Context: Land Colonization and Conservation in Sarapiquí." In *La Selva: Ecology and Natural History of a Neotropical Rainforest*, edited by Lucinda McDade, 299–328. Chicago: University of Chicago Press.
- Carr, D. 2008a. "Farm Households and Land Use in a Core Conservation Zone of the Maya Biosphere Reserve, Guatemala." *Human Ecology* 36 (2): 231-248.
- Carr, D. 2009b. "Population and Deforestation: Why Rural Migration Matters." *Progress in Human Geography* 33 (3): 355–378.
- Castles, S. and M. Miller. 2009. *The Age of Migration*. Basingstoke: Macmillan (4th edition).
- Caviglia-Harris, J., E. Sills, and K. Mullan. 2012. "Migration and Mobility on the Amazon Frontier." *Population and Environment* 34 (3): 338–369.

- Cruz, M. C. Meyer, R. Repetto, and R. Woodward. 1992. *Population Growth, Poverty, and Environmental Stress: Frontier Migration in the Philippines and Costa Rica*. World Resources Institute.
- Creswell, J. W. 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 3rd ed. Thousand Oaks, CA: Sage Publications.
- de Sherbinin, A., L. Vanwey, K. McSweeney, R. Aggarwal, A. Barbieri, S. Henry, L. Hunter, and W. Twine. 2008. "Rural Household Demographics, Livelihoods and the Environment." *Global Environmental Change: Human and Policy Dimensions* 18 (1): 38-53.
- Edelman, M. 1999b. *Peasants Against Globalization: Rural Social Movements in Costa Rica*. Stanford, CA: Stanford University Press.
- Estado de la Nación and INEC. 2012. *Indicadores Cantonales: Censos Nacionales de Población y Vivienda 2000-2011. Programa Estado de la Nación en Desarrollo Humano Sostenible*. San Jose. 196p. [Accessed online at: http://www.estadonacion.or.cr/files/biblioteca_virtual/otras_publicaciones/Indicadores-Cantonales-partes-introductorias.pdf]
- Faure, G. and M. Samper. 2004. "Veinte Años de Apertura Económica: El Provenir Comprometido de la Agricultura Familiar en el Norte De Costa Rica." *Anuario de Estudio Centroamericanos*, Universidad de Costa Rica 30 (1-2): 7-26.
- Gindling, T.H. 2009. "South-South Migration: The Impact of Nicaraguan Immigrants on Earnings, Inequality and Poverty in Costa Rica." *World Development* 37 (1): 116-126.

- Golley, F., M. Olien, and D. Hoy. 1971. "Cognized Environments of San Carlos Valley Migrants." *Revista Geográfica* 74: 33–50.
- Gosnell H. and J. Abrams. 2011. "Amenity Migration: Diverse Conceptualizations Of Drivers, Socioeconomic Dimensions, And Emerging Challenges." *Geojournal* 76: 303-322.
- Hall, C. 1984. "Regional Inequalities in Well-Being in Costa Rica." *Geographical Review*, 74 (1): 48-62.
- Hall, T.D. 2000. Frontiers and Ethnogenesis, and World-Systems: Rethinking the Theories. T.D. Hall (ed.) *A World-Systems Reader: New Perspectives on Gender, Urbanism, Cultures, Indigenous Peoples, and Ecology*, pp. 237–70. Boulder: Rowman & Littlefield.
- Hamilton, N. and N.S. Chinchilla. 1991. "Central American Migration: A Framework for analysis." *Latin American Research Review*, 26 (1): 75-110.
- Harvey, D. 2005. *A Brief History of Neoliberalism*. New York, NY: Oxford University Press Inc.
- INEC, 2011. Instituto Nacional de Estadísticas y Censos de Costa Rica. Census Data (<http://www.inec.go.cr/>).
- Jepson, W. 2006. "Producing a Modern Agricultural Frontier: Firms and Cooperatives in Eastern Mato Grosso, Brazil." *Economic Geography* 82 (3): 289-316.
- King, R. and R. Skeldon. 2010. "Mind the Gap! Integrating Approaches to Internal and International Migration." *Journal of Ethnic and Migration Studies* 36 (10): 1619-1646.

- Kull, C., C. K. Ibrahim, and T. Meredith. 2007. "Tropical Forest Transitions and Globalization: Neo-Liberalism, Migration, Tourism, and International Conservation Agendas." *Society & Natural Resources* 20 (8): 723-737
- Lambin, E.F., H.J. Geist, and E. Lepers. 2003. Dynamics of land use and land cover change in tropical regions. *Annual Review of Environmental Resources* 28: 205-241.
- Lee, S. E. 2010a. "The Ties Made in the Harvest : Nicaraguan Farm-Worker Networks in Costa Rica ' S Agricultural Exports." *Journal of Agrarian Change* 10 (4): 510–536.
- Lobao, L. 1996. "A Sociology of the Periphery Versus a Peripheral Sociology: Rural Sociology and the Dimension of Space." *Rural Sociology* 61 (1): 77-102.
- Lundquist, J., and D. Massey. 2005. "Politics or Economics? International Migration during the Nicaraguan Contra War." *Journal of Latin American Studies* 37 (1): 29–53.
- Marquette, C. 2006a. "Migrant Welfare on Tropical Forest Frontiers in Latin America." *Population and Environment* 27 (5/6).
- Marquette, C. 2006b. Nicaraguan Migrants in Costa Rica", *Poblacion y Salud en Mesoamerica*, 4,1, informe tecnico 1, Revista electronica: Cento Centroamericano de Poblacion. <http://ccp.ucr.ac.cr/revista/>
- Massey, D., and R. Zenteno. 2000. "A Validation of the Ethnosurvey: The Case of Mexico-U.S. Migration." *International Migration Review* 34 (3):766-793.
- Morse, W., J. L. Schedlbauer, S. E. Sesnie, B. Finegan, C. A. Harvey, S. J. Hollenhorst, K. L. Kavanagh, D. Stoian, and J. D. Wulforth. 2009. "Consequences of Environmental Service Payments for Forest Retention and Recruitment in a Costa Rican Biological Corridor." *Ecology and Society* 14 (1): 23.

- Rodriguez, A. and J. Avnedaño 2005. "Empleo agropecuario y cambios socio-ocupacionales en la Región Huetar Norte. 1984-2000" in Samper, Mario (ed.), *Trayectorias y disyuntivas del agro en la Zona Norte de Costa Rica*. San José, Costa Rica: Instituto de Investigaciones Sociales, Universidad de Costa Rica, y CIRAD 79-92.
- Rudel, Thomas K., 2002. Paths of destruction and regeneration: globalization and forests in the tropics. *Rural Sociology* 67 (4): 622–636
- Sana, M., and D. Massey. 2005. "Household Composition, Family Migration, and Community Context: Migrant Remittances in Four Countries." *Social Science Quarterly* 86 (2): 509–528.
- Sandoval-García, C. 2010. *Shattering Myths on Immigration and Emigration in Costa Rica*. Lexington Books.
- Schelhas, J., and G. Arturo Sánchez-Azofeifa. 2006. "Post-Frontier Forest Change Adjacent to Braulio Carrillo National Park, Costa Rica." *Human Ecology* 34 (3): 407–431.
- Scoones, I. 2009. "Livelihoods Perspectives and Rural Development." *Journal of Peasant Studies* 36 (1).
- Shaver, I., A. Chain-Guadarrama, K. Cleary, A. Sanfiorenzo, R. J. Santiago-García, L. Waits, B. Finegan, L. Hormel, N. Sibelet, L. A. Vierling, M. Fagan, N. Bosque-Pérez, M. E. Fagan, and F. DeClerck 2014. "Coupled social, economic and ecological outcomes of agricultural intensification in Costa Rica and the future of biodiversity conservation in tropical agricultural regions." Submitted to *Global Environmental Change*.
- Seligson, M. 1979. "The Impact of Agrarian Reform: A Study of Costa Rica." *The Journal of Developing Areas* 13 (2): 161-174.

Sewastynowicz, J. 1986. “‘ Two-Step ’ Migration and Upward Mobility on the Frontier : The Safety Valve Effect in Pejibaye, Costa Rica.” *Economic Development and Cultural Change* 34 (4).

Walker, R., S. Perz, M. Caldas, and L.G.T. Silva. 2002. “Land Use And Land Cover Change In Forest Frontiers: The Role Of Household Life Cycles.” *International Regional Science Review* 25 (2): 169-199.

Chapter 3

An Analysis of the Factors that Facilitate Persistence of Family Farmers in Agriculture on the Costa Rican Frontier

Abstract

Producing and selling food in modern, global markets is fiercely competitive and presents several challenges to family farmers. When family farmers are participating in this modern agrifood system, how they are participating or what alternatives they have found are critical to understanding contemporary agrarian livelihoods. These questions also inform the social and ecological implications of the partial process of capitalist incorporation of agriculture. This article focuses on the modernization of agricultural markets in the Sarapiquí region, located in Northern Costa Rica and demonstrates how farmers' decisions to participate or not in these modern markets is related to structural and ecological factors and navigation of both individual and collective capital within particular agricultural sectors. We demonstrate our findings through descriptive, quantitative and qualitative analysis of surveyed farmers, and from interview data with producer organizations, agricultural policy makers and government representatives. We describe the market structure and collective organizations operating in three different agricultural product sectors (i.e. pineapple, pepper, cattle and dairy) that span modern and traditional markets. Real farmer and rancher profiles are compared to demonstrate the range of how family farmers construct their livelihoods in relation to these agricultural product sectors, collective capital and the crop or product's characteristics. We find that, although agricultural production and markets have become more oriented towards export crops like pineapple for international trade, family farmers in the frontier region of Northern Costa Rica mostly are participating in domestic markets for traditional crops or

products. They make this decision based on reasoning that weighs the tradeoffs in cost, risk and market accessibility, with their individual capabilities and the characteristics of the crop or product and finally in relation to support from the state and producer organizations.

Key words: family farm, corporate food regime, Costa Rica, political economy of agrarian change, traditional markets

‘The farmer is unprotected. There is no future and no tomorrow. We grow [crops] without knowing if we are going to sell them or if there is going to be a good price. It is nothing more than a lottery... We are in defense that agriculture must continue. Today, we look for solutions or alternatives so that farmers can continue to produce. There are a million things that traumatize the farmer. So the farmer must resist [them] with the hope that one day will be the day.’

—Farmer and President of the farmers’ organization for Sarapiquí County

Introduction

Since 1980, the global agrifood system has changed dramatically while family agriculture has largely been neglected as an economic sector worthy of public investment (McMichael 2005,2009, de Janvry 2010, Pehlaner and Ortero 2010). These combined factors have led to new challenges for the family farm. In the current global agrifood system, a number of factors have become especially critical to a family farmers’ ability to maintain an agrarian livelihood: market structure, national policies, the existence and effectiveness of cooperative organizations, and crop/product characteristics (Reardon and Flores 2006, Reardon et al. 2009, Berdegúe and Fuentealba 2011).

However, the vast majority of smallholder development programs at the national and international levels, though designed to help the family farmer, have neglected addressing the generally hostile context for family farming across the world. The programs instead focus on improving individual assets of the family farmer or farm without addressing the contextual or structural barriers (Berdegúe and Fuentealba 2011). Throughout this paper contextual or structural factors signify national and international policies, market structure, state support and intervention, producer organizations, local environmental conditions and crop characteristics. This definition excludes the individual assets of a farmer.

Producing and selling food has become fiercely competitive and often requires participating in an increasingly complex global marketplace. In response to this, farmers are increasingly being encouraged to see themselves as entrepreneurs to face the fundamental changes in global agrifood markets (Reardon and Flores 2006, Berdegúe and Fuentealba 2011). Global competition combined with the unequal distribution of assets among farmers creates a sharp distinction between the successful and the failed farm, especially in frontier regions (Barbier 2012).

These frontier regions located geographically and socially at the margins of the national and global economy, are often characterized by a dualist, resource-based development process (Barbier 2012). In a dualist development process, the farmers find that agricultural production, markets and wealth become bifurcated between a modern entrepreneurial commercial class and a traditional subsistence or semi-commercial class of farmers. This

bifurcation naturally leads to growing rural inequality (Berdegúe and Fuentealba 2011, Barbier 2012, Bernstein 2010).

At the same time, as countries pursue the full incorporation of family farms into the global economy they risk the disappearance of the traditional, subsistence class of farmers, thereby arguably losing the family farm in agrarian economies across the developing world. This structural transformation of agriculture is evident in developed countries where the percentage of income spent on food has declined with rising per capita income and gross domestic product while the agricultural sector has contracted and agribusinesses emerge as the major farming type while family farmers age out of the industry (de Janvry 2010).

Modern agrifood systems are rapidly maturing in developing countries like Costa Rica. Recent research has begun to document how small farmers participate in or are excluded in this transformation of agrifood systems or what McMichael (2005) calls ‘the corporate food regime’ across Latin America (Escobal and Avero 2012, Eakin et al. 2014, Birner and Resnick 2010, Carletto et al. 2010, Ruben and Sáñez 2008, Challies and Murray 2011, Fold and Gough 2008, Reardon and Flores 2006, Berdegúe et al. 2005). Most of these studies demonstrate that integration into increasingly modern markets can sometimes be a better or more successful arrangement for family farms than what is attained through persisting in traditional sectors and markets by increasing income but it is not necessarily so. Moreover, often inclusion has negative indirect impacts especially on smaller scale family farmers who become increasingly marginalized. They demonstrate that inclusion and its economic returns are often heavily conditioned by structural factors such as international aid, substantial state

involvement or the formation of producer organizations. Still, questions remain regarding how we might define family farm inclusion or success in relation to these modern markets as well as how we could decide upon an appropriate timescale to evaluate inclusion or success (Carletto et al. 2010). Furthermore, there is a need for studies researching how small farmers persist in marginalized, traditional sectors, despite modernization of markets and massive global restructuring in the corporate food regime (Bernstein 2010). My analysis will focus on understanding the persistence of farmers in predominantly traditional sectors or domestic markets and the strategies they use to find alternatives to these modern markets.

To understand the causes and consequences of modern agrarian change scholars call for research that uses agrarian political economy approaches that address state-society interactions embedded within the everyday politics of rural livelihoods (Borras 2009, Bernstein 2010). I will use this relational multi-scaled approach to reveal the complexity of how farmers piece together their livelihoods and find a way to persist and sometimes prosper through optimal use of state support, markets, producer organizations and crop characteristics.

The Sarapiquí region, within the San Juan La Selva Biological Corridor, in northern Costa Rica provides a case for examining how farmers persist within and on the margins of the modern agrifood system because this region is a recent agricultural frontier of Costa Rica. In the past 30 years, the region has experienced a highly compressed development process and has only begun incorporation into the national and international economy. Sarapiquí is rapidly becoming a modern agricultural export production and processing zone (mostly of pineapple) characterized by a diversified rural economy and a contracting smallholder agricultural sector

(Shaver et al. 2014). The small family farm stands in sharp contrast to the region's increasing number of modern agribusinesses (i.e., mostly contract producers for Del Monte and Dole). Agricultural land use and agrarian livelihoods are under competing pressures within two divergent development narratives; one narrative emphasizes biodiversity conservation and multifunctional agriculture (Harvey et al. 2008) while the other characterizes rural development as modern agricultural export production (Conroy et al. 1996). Under these narratives, in this region, small family farmers, defined as farmers with 2-30 hectares of land, also retain considerable forest cover and therefore are expected to bear that burden of conservation (Morse et al. 2009). Their most valuable assets are land and they subsist from agricultural based income, but they are largely unable to compete in export crop production on the global marketplace. In this sense, family farmers in our study region are stuck in the middle of these competing pressures of dominant development narratives.

This article will focus on the modernization of agricultural markets in the Sarapiquí region and demonstrate how farmers' decisions to not participate in modern export markets is related to political economic change, availability of capital, bargaining power and personal objectives. I will first describe the market structure and collective organizations operating in three different sectors that span modern and traditional markets (i.e. pineapple, pepper, cattle and dairy). And finally, I will demonstrate how family farmers make a living in relation to these markets, organizations and the product's unique characteristics.

Theoretical Framework

The family farm and the potential roles it can have in economic growth and development has been a controversial and evolving issue in rural development theory. Roles and theories of the family farm have changed along with the political, economic and social conditions of the family farm. Early theories of rural development in the 1950s were heavily influenced by modernization theory, the dual economy model (juxtaposing the urban and rural economy), and conceptions of peasants as ‘lazy’ and family agriculture as ‘backward’ and economically irrational (see review by Ellis and Biggs 2001). An important development in the late 1960’s repositioned the family farm as the principal unit and engine of agricultural economic growth and industrialization. These scholars identified family farmers as highly efficient rational economic actors but still focused on the idea that farmers just needed to take advantage of the opportunities in the agricultural sector through implementing new technology and becoming more educated (see review by Ellis and Biggs 2001).

The focus then turned toward maximizing the efficiency and productivity of family farms through the green revolution, which included methods such as technological transfer, mechanization and agricultural extension and education (see review by Ellis and Biggs 2001). This was called the Alliance for Progress in Latin America and was the impetus for the formation of the Ministry of Agriculture (MAG) and extension services designed to transfer knowledge from the US to the developing world (Nystrom and Haverstock 1966). Increasing the role of the state was central to this paradigm; the state coordinated rural development through land reforms, para-statal producer cooperatives, stabilizing prices, and by providing access to credit and subsidies (de Janvry 2010). However, during this period, the terms of

trade were unfavorable to agriculture and resulted in underperformance in the agricultural sector (de Janvry 2010).

In the 1970's, a political economic critique of these arrangements gained strength and argued for agrarian change (see review by Bernstein 2010). This critique highlighted the structural disadvantages that distort equitable resource distribution and terms of trade that minimize the power of individual family farmers to participate in the global economy. Latin American theorists in particular criticized the focus on individual or farm system improvements, without addressing what they saw as the larger structural inequalities that systematically marginalized family farmers, rural regions and peripheral countries (see review by Gwynne and Kay 2004). The shift toward studying the structural context affecting agriculture in developing countries that began in the 1970's was not long lived. Since 1980, mainstream development economics literature, with some notable exceptions (e.g. Chambers et al., 1989), has neglected family agriculture as it has become increasingly marginalized in the corporate food regime and neglected politically through disinvestment (de Janvry 2010, McMichael 2005). Agricultural or rural poverty is often analyzed and discussed in dominant development discourse as a product of traditional culture and unchanging preferences, advocating for technological advancement and entrepreneurial development to transform them into commercial farmers. However, this perception disconnects rural livelihoods from their relationship to the state and society, and from the development in other agricultural sectors, in other economic sectors and from the world system that are directly related to their 'underdevelopment' (de Janvry 2010). For this reason, in this chapter, we draw from this earlier structural critique and highlight the

structural factors that influence farmer performance, and have gained importance in the context of the corporate food regime.

Generally speaking, in the corporate food regime, rural economies are characterized by 1) dismantling of state support agencies and protective agricultural policies, 2) liberalization and modernization of agricultural markets and promotion of non-traditional exports for global trade, 3) the rise of the agri-industrial production systems and decline of the smallholder production systems, and finally 4) rural livelihood diversification and increased rural inequality (Edelman 1999, Kay 2008, Reardon et al. 2009).

Under the corporate food regime, the global, structural conditions for agricultural growth have changed dramatically: the modernization of agricultural markets and globalization of the food system, climate change and resource scarcity, and a call for agriculture to provide environmental and biodiversity conservation services (McMichael 2005, 2009, Harvey et al. 2008, de Janvry 2010).

Rural space, specifically the frontier, has repeatedly been the geographic container of populations that exist on the margins of the global and national economy. Agriculture is a natural refuge for marginalized populations and land use change and degradation are more pronounced and evident in the periphery as there is often an intersection with social and ecological marginality (Carr 2009, de Janvry 2010). The neglect of the agricultural sector and the family farm has resulted in serious social, ecological and economic crises including food security issues and persistent global rural inequality and poverty. These repercussions are only

beginning to bring family agriculture back to the forefront of international development. A renewed appreciation for the important role of family farms in alleviating rural poverty and addressing food security in rural economies prompted a recent effort in academia and development scholarship to expand their definition of agricultural development beyond the individual and technological transfer and towards addressing the structural conditions of agricultural growth (de Janvry 2010, Berdegúe and Fuentealba 2011)).

The expanded definition of agriculture exemplified in the work by de Janvry (2010) allows us to explore how family farmers can become more integrated and more economically successful in the corporate food regime or maintain agrarian livelihoods in non-incorporated, traditional or marginal sectors of the agricultural economy (Escobal and Avero 2012, Eakin et al. 2014, Carletto et al. 2010). These inquiries explicitly focus on a more holistic analysis of the factors, both individual and structural that enables family farmers to persist and prosper in agrarian livelihoods (Borras 2009, Bernstein 2010). Our research contributes to this area of research. Part of understanding why and how farmers are persisting in traditional or marginal markets is related to understanding the barriers they face to become commercial farmers and participate in modern markets. These are summarized in the following section.

Individual-Level Decisions and Characteristics

Overall, farmers in the developing world have among the lowest measures of social wellbeing, and the economic gap between them and the rest of the rural population engaged in other sectors of the economy is widening. When compared to other Latin American countries, Costa Rica has the widest gap (Berdegúe and Fuentealba 2011). Individual characteristics of

farmers that limit their entrepreneurial or commercial capability such as low educational attainment, low asset endowments, or agro-ecologically marginal landholdings are the same characteristics that result in low levels of social wellbeing (Berdegú and Fuentealba 2011).

Scholars have noted, that there are two broad classes within the farming population of Costa Rica participating in two different agricultural economies: the commercial farmer in the modern market and the semi-commercial or subsistence farmer who is rooted in the traditional market (Schelhas and Sanchez-Azofeifa 2006, Ruben and Sáñez 2008). Family farmers throughout this paper are defined as farmers that produce between 2-30 hectares of land and/or run their farm based primarily on family labor and management (Ruben and Sáñez 2008).

The failure of the family farmers to participate in modern markets is often attributed to individual deficiencies in character. Scholars tend to cite the lack of necessary skills for organization, and upward mobility such as education, entrepreneurial vision, financial capacity and management skills as the key reasons why farmers do not participate in modern markets (Hellin et al. 2009, Seunuke et al. 2013). However, different types of farmers are constrained in different ways structurally and have multiple objectives, both economic and non economic, that drive their ambitions and land use decisions. For example, when classifying dairy farmers in Costa Rica, Solano et al. 2001 found that farmers were very heterogeneous in their objectives even within the same sector and locale, weighing both economic and non-economic factors. Research suggests that generally farmers in developing countries, if they are compelled to participate in modern market systems, base decision on

several factors: 1) the relative price of the product 2) the cost of technology needed to compete and 3) the risk of participating in these markets (Reardon et al. 2009). Threshold investments, both financial and non-financial, in non-land assets have been shown to be critical for inclusion in the modern agrifood system (Reardon et al. 2009). Furthermore, the capacity of a farmer to make the necessary investments to compete in modern commercial agriculture systems is determined by their household characteristics, assets, their collective capital, or affiliation with a producer's organization, and by their access to state or non-governmental help (Reardon et al. 2009). In general, family farms tend to prioritize inheritance, survival and autonomy over risk taking and increasing economic gain or growth (Seunuke et al. 2013).

To analyze farmers it is important to understand the diversity of objectives potentially operating in their decision-making. Entrepreneurship, if that is the farmer's primary objective, is facilitated in different ways, by different contexts. A one-size-fits-all, liberalized, global context for agricultural production and marketing may not encourage entrepreneurship in the same way that a more protected state led sector did (Bernstein 2010). Some scholars, such as Harvey 2005, go on to contend that blaming the individual for not adapting to and taking advantage of global political economic restructuring is an ideological construct of neoliberalism that downplays the structural factors that constrain and enable agrarian livelihood formation and success (Harvey 2005). Such conceptualizations further protect the concept of the free market as free despite considerable evidence that economic liberty and wealth creation are heavily conditioned by initial wealth and many more factors than just personal initiative (ibid.). Individual characteristics and objectives are fundamental to a

farmer's ability to improve his economic situation however; individual capabilities should be assessed in relation to specific contexts and structural conditions.

Producer Organizations' Characteristics and Role in Facilitating Participation in Modern Agricultural Markets

Producer organizations⁴, which are an important part of this study region context, operate within the agricultural sector as a way to build collective capital. They can reduce transaction costs through allowing bulk purchasing thereby reducing market entry barriers. Producer organizations can increase bargaining power, provide venues for the pooling of investment resources and provide access to quality information about markets and standards (Markelova et al. 2009).

Several factors, both internal and external, contribute to the potential success of producer organizations. Group characteristics, institutional arrangements and the types of products and markets in practice generally structure the success of producer organizations.

The capitals of the individual affiliates are directly related to collective capitals of any given producer group. Organizations that represent larger, more economically powerful interests tend to have more political and financial capital. Charismatic leaders also can garner collective political or social capital (Hellin et al. 2009). Organizations typically fare better when they not only have transparent and inclusive internal processes but also when they are supported through institutional arrangements with government or non-governmental institutions that provide continued long-term capacity building and financial support (Reardon

⁴ Producer organizations are groups of farmer who form co-ops or organizations to lobby on behalf of their interests, reduce transaction costs for market participation or share land or equipment.

et al. 2009). Such support can be provided by the private sector but evidence has shown that the private sector typically, with the exception of some contract farming cases (Grossman 1998), has not been effective at replacing governmental support for these kinds of organizations because there are high transaction costs and low profits earned for helping them (Hellin et al. 2009).

Structural Factors That Facilitate Family Farmer Inclusion and Organizational Success

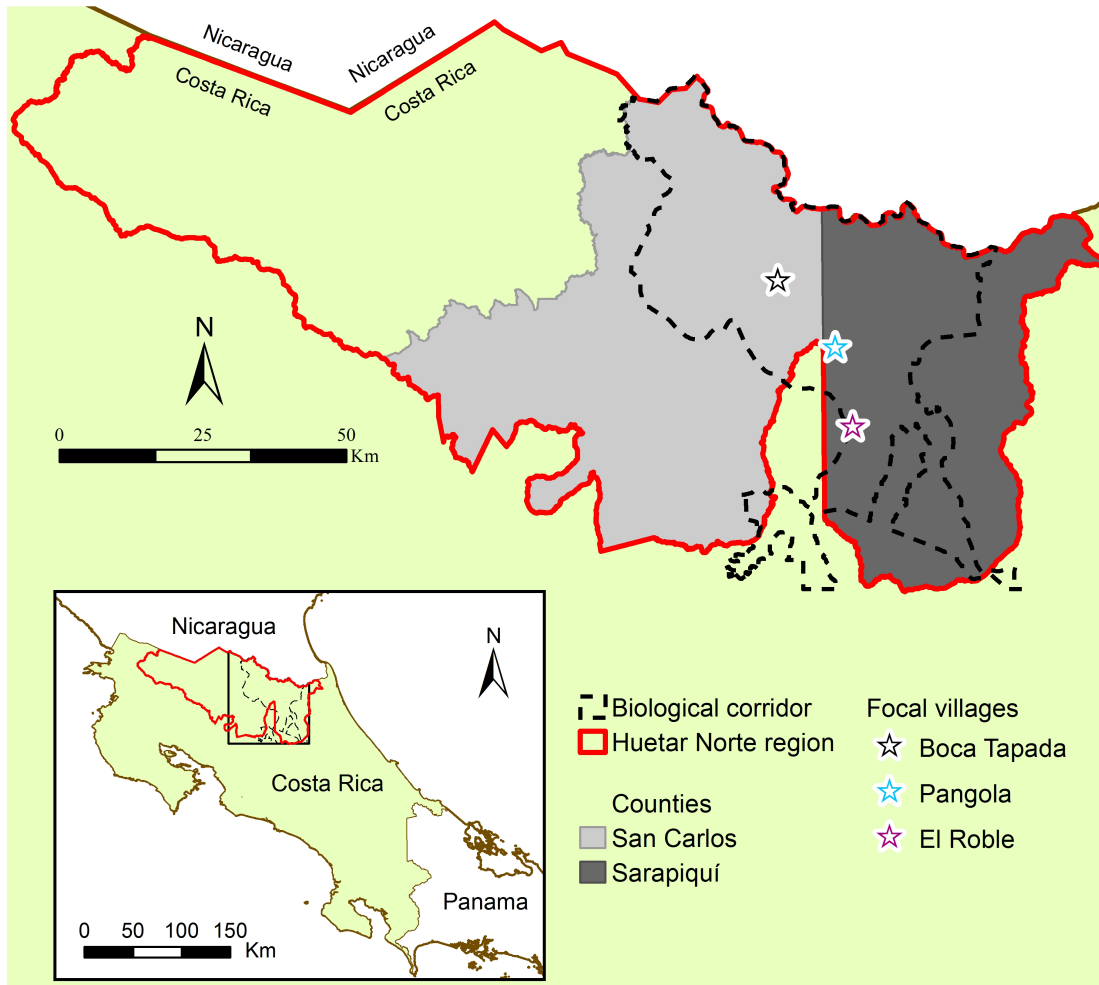
Family farmer inclusion and the potential success of a producer organization are partially determined by structural factors unrelated to either of them. For example, market sectors dominated by smallholders tend to source agricultural products from smallholders more and sectors dominated by large holders typically source products from large holders (Reardon et al. 2009). This preference can naturally include or exclude small farmers. In some cases, wholesale companies will provide resource provisions to producers that enable smallholders to participate by subsidizing their production. In other cases, despite market modernization, there may be little or no effect transferred to smallholders because these farmers continue to rely mainly on a traditional market system (Reardon et al. 2009). In this case, the small holder can be isolated from market modernization and is not forced to compete in those markets. This is the case for some of the surveyed farmers portrayed in the results because they only operate in traditional markets. In some cases this isolation results in lower economic earnings but is nonetheless protective of an agrarian based livelihood, as their costs and levels of production would be uncompetitive in the modern sector and likely require support from non-agricultural sources of revenue.

The external environment, the markets in practice and the product also determine if the creation of a producer organization is a viable path for entering into the commercial agricultural market. If the markets in practice present high transaction costs for small farmers to participate then the incentive to organize is higher (Hellin et al. 2009). Generally, the longer the value chain is, the more disadvantages smallholders face and thus the more incentive for collective organization. More successful organizations operate where transaction costs to participate in markets are high enough to incentivize organization. Products that are intensively produced typically require specialized technology or knowledge, and are higher risk or require high investment; these factors can be reduced through collective action (Markelova et al. 2009).

Study Site

The study region is located within the Huetar Norte region in the counties of San Carlos and Sarapiquí. The terrain is slightly hilly in upper elevation areas, while the lowlands are alluvial terraces and flood plains that range from 0-400 m in elevation (Sesnie et al., 2009). This region falls in the wet tropical life zone and secondary and old growth forests cover just under half of this region (*sensu* Holdridge et al., 1975, Morse et al. 2009, Fagan et al. 2013). Soils are acidic (pH ~4.5) primarily Inceptisols and Ultisols and the lowland terrain provide are well suited for cattle grazing and the cultivation of crops, like pineapple, that require well-drained acidic soils (Sollins et al., 1994). The most common pineapple variety planted in the study region, MD2, grows well in soils with 4.5 to 5.5 pH and slopes < 15% (Barrientos and Porras, 2010).

Figure 1: Map of Study Region, Focal Villages and Selected Counties



This region illustrated in Figure 1 is the agrarian frontier of Costa Rica and was the site of a government sponsored settlement and colonization program led by the Institute of Agrarian Development (IDA) for family farmers. Settlement of this region was at its height in the 1980s and many poor land seeking households migrated here especially during the years after the debt crisis of 1980 (Schelhas and Sanchez- Azofeifa 2006, Cruz et al. 1992). This period, furthermore, coincided with the changes in agricultural policies characteristic of the nascent corporate food regime period. By 1980, under policies of import substitution, Costa Rica found itself in the worst economic crisis in over 50 years and was the first Central American

country to default (Brockett 1998). Wars in Nicaragua and El Salvador created regional instability, increased migrants to Costa Rica and decreased the productivity and power of the Central American Common Market. Costa Rica fell into a deep recession and accepted the first of three structural adjustment programs over the next 3 years (Edelman 1999).

Between, 1983-85 Costa Rica received 592 million dollars from USAID with major strings attached to liberalize the agricultural economy (Edelman 1999). Such aid reoriented agricultural state incentives away from traditional or domestic production (especially basic grains) towards non-traditional export production of fresh fruits and vegetables for international export (Edelman 1999). Structural adjustment also resulted in a 28% decrease in the government and a 64% decrease in funding for the Ministry of Agriculture, the largest cut in Central America from 1979-1988 (Lee 2010). The shift from statist to market oriented economic systems was occurring across the world and the conditions of agricultural production changed dramatically after structural adjustment. Many of the reforms directly targeted and re-oriented the incentives and support away from small and medium producers and towards large agribusinesses (Edelman 1999, Thrupp 1995, Conroy et al. 1996).

However, in the decade after the debt crisis, agriculture was the only economic sector that grew and Costa Rica became an export agricultural development success story (Edelman 1999). Export agriculture continues to be a growing economic sector accounting for 37.9% of all exports (SEPSA/MAG, 2011). Despite this growth at a national level, the study region evolved two different agricultural economies that developed unevenly: the traditional, non-capitalist sector, which is subsistence-oriented or operates predominately in traditional

markets; and the modern, capitalist sector, which is export market-oriented and follows the logic of profit maximization (Sanchez-Azofiefa 2006, Ruben and Sáñez 2008,). This uneven process manifested itself in the development of two farming classes, the capitalist commercial farmer class and the semi-capitalist, the subsistence or traditional farmer class (Ruben and Sáñez 2008).

Since 1986, the area dedicated to the production of pineapple has increased from 482.5 ha. to 22138.9 ha (Shaver et al. 2014). This growth entails the replacement of pasture and smallholder crops with large-scale pineapple plantations (Fagan et al 2013). The expansion of pineapple is representative of the expansion of non-traditional agricultural exports for global trade and the expansion of a modern agricultural market. It is a sector dominated by an elite class of farmers, which take the form of agribusiness, and is an indicator of the process of capitalist incorporation of the frontier.

Since 1996 due to the Forestry Law (no.7575) that prohibited land use conversion of natural forest, the rate of deforestation has slowed, signaling some forest transition and recovery (Morse et al. 2009). Even though this region accounts for just under half of the national land area in pineapple, fragmented tropical rainforest, privately owned by ecotourism reserves, farmers and ranchers, still covers 47.2% of this landscape (Shaver et al. 2014). For this reason, this region is a priority area for the payments distributed through environmental services programs, market based conservation programs that compensate farmers for retaining forest or for engaging in agroforestry or reforestation (Morse et al. 2009). Furthermore, this region forms a critical link, the San Juan La Selva Biological Corridor, within the larger

Meso-American Biological Corridor initiative that seeks to protect fragmented forested land in a connected corridor from Mexico to Columbia.

Agrarian change within this region is tied to larger regional changes signaling the decline of the family farm. Within the larger Huetar Norte region (Figure 1), which encompasses the study region, the number of people participating in the agricultural sector has decreased by 17.3 % and farmers working their own farms have decreased by 30%. Although agriculture still accounts for 46% of regional employment, half of the people in the agriculture sector support themselves from participating in other economic sectors (Rodríguez and Avnedaño 2005). Rural households in Costa Rica have responded to declining agricultural viability by diversifying their livelihood portfolios to include, wage labor, informal micro enterprises, and migration (Edelman 1999, Sick 1997, Kull et al. 2007). In this context, households, especially farming households, are increasingly differentiated from each other and the rest of the non-farming rural population by household characteristics (e.g. age, education, family size, dependency rate), production scale, resource endowments, spatial location, and access to infrastructure and market characteristics (Ruben and Saenz 2008, Schelhas and Sanchez-Azofeifa 2006). The differences among households demonstrate the heterogeneous nature of family farmer profiles.

The Sarapiquí region in northern Costa Rica illustrates patterns of agrarian change typical of tropical frontier regions transitioning from smallholder or familial farming systems towards large-scale agribusiness production systems. Furthermore, this region aptly represents a paradox of modern rural landscapes where the consequences of globalization on agriculture

and biodiversity conservation are in full contrast. Farmers and ranchers are increasingly exposed to riskier modern agricultural markets, with declining state support, while bearing heavy conservation burdens (i.e. land in forest) critical to maintain the biodiversity of these tropical rural landscapes (Hecht 2010).

Methods

Field research was conducted from 2011-2013 over a period of 12 months. We utilized a sequential mixed method design (discussed in Creswell 2009), which includes participant observation, and ethnographic field methods, community workshops, a household survey and semi structured in-depth interviews. Each method is used to inform the following method, capture missing or inadequately detailed data in previously employed methods. The sequential design is used to maximize the strengths of each method (i.e., generalizability and in-depth analysis) in a complementary fashion to gather data at multiple scales from the household, community and larger regional and national scales. For example, ethnographic fieldwork and community workshops were fundamental to designing the interview guide, identifying key informants, and developing the survey language, questions, and anticipated responses.

From September 2011 to May 2013 we conducted thirty-five semi-structured interviews. Participants in our sample were selected to include a wide range of individuals and organizations involved in agricultural production, policy and collective organization in the study region, including agricultural producers' organizations, large landholders, and regional and national agricultural government officials. Interviews lasted between 1-2 hours and were conducted in both Spanish and English. The interviews were digitally voice-recorded, fully

transcribed and then coded in ATLAS Ti for themes drawn from the theoretical framework presented above. Each transcript underwent two rounds of coding, the first being preliminary and raw coding, based on sensitizing concepts (migration, agrarian reform, and the community development process, socio-economic mobility etc.) and captured in situ codes that arise directly from the participant's speech. This first round is done quickly and bins quotes into large themes. The second round of coding was more focused and conducted line by line to unpack the sensitizing concepts into sub categories and capture a more in depth interpretation of the range and variability within each theme (for a full discussion of this method see Charmaz 2014). Demonstrative quotes were selected to illustrate major themes and the range of perspectives.

The survey lasted between 30 minutes to an hour. It was conducted in person in an ethno-survey method (Massey 1987, Masey and Zenteno 2000). Between my field assistant and me, one person took notes and observations as the other administered the survey to allow for the simultaneous collection of qualitative, ethnographic and quantitative data. The survey has 4 major sections that address: 1) socio-economic/demographic 2) land 3) migration and 4) environmental factors. These factors are synthesized to form profiles of farmers that are slightly modified from real cases to protect identities and confidentiality but are representative of the major patterns in household characteristics, land use decisions, and circumstances evident in the data. Survey data presented on farmers (Table 2) is drawn from a sub sample of the sampled population that is 30 participants who self-identified as farmers.

Three villages were selected to focus the sampling of the household surveys. These villages spanned the area of the biological corridor, representing a gradient of urbanization or economic development, a gradient of forest cover and a gradient of extension of pineapple cultivation, the last of which was used as a proxy for agricultural modernization. El Roble is the most populated village and has the lowest forest cover (38%) in the surrounding area with the largest amount of hectares in pineapple cultivation. Pangola has moderate levels of each factor, and the village of Boca Tapada, which lies very close to the Nicaraguan border, is very rural - with largely intact forest cover (67%). Pineapple cultivation is only just starting to expand into the area surrounding Boca Tapada. My sample represents people that live and work in this landscape. There is a population of absentee landowners that are not captured in this sample, in part due to the logistical complexity of sampling them and due to the fact that research questions are focused on agricultural producers actually living in this region. Households were identified with aerial photos and handmade maps, assigned random numbers, and then randomly sampled. We sampled 6% of the El Roble region, 23% of Boca Tapada and 22% of Pangola. In total, 139 households or almost 10% of the households within the three focal villages were sampled. We had 6 refusals. The data presented here is from a subsample of 30 households of self-identified family farmers and 35 semi-structured interviews from agricultural and rural development experts, producer organizations and large landholders.

Findings

Even though the modern agrifood system is maturing in Costa Rica and is evidenced in the growth of the pineapple sector, the majority of farmers in our sample participated in the

traditional sector, producing lower value crops for the domestic market. In this section we will first review the individual characteristics of the farming sample. We will then discuss the pineapple market sector, characteristics of the main producer organization, and then will compare 2-3 real farmer profiles. This same sequence will be used to then discuss the pepper sector and finally the cattle and dairy sector. Findings will end in a comparison of the sectors and their advantages and disadvantages for the diversity of family farmers exhibited in the farmer profiles.

Out of a random sample of 139 households, only 30 household heads stated that they were farmers. This low number and the fact that only ten farmers (Table 1) are able to earn their principal income from farming, indicate the declining state of the family farm, even on the frontier where agriculture is a prominent economic sector and source of regional employment. Key population characteristics are further outlined in Table 1.

Consistent with the above discussion of major changes in the political economy of agriculture, farmers in the study region demonstrate that these changes have made it more difficult to maintain agrarian livelihoods for many farmers. The majority of research participants believe it has gotten harder to live from farming (Table 1). Cited reasons for the difficulty include “little financing and too much paperwork to apply for credit”, or “you have to buy very expensive inputs and then have to sell your products very cheap”, and “its difficult to find markets for products because of too much importation and low prices.” Many see a pessimistic future for farmers in this region saying, “there is no future”, or “disappearance”. While others see the future is promising in “exportation” and “if you work hard you can get

ahead”. Most want their children to inherit the farm but only 6 households think their children want to become farmers (Table 1). Farmers would like to see “loans with low interest”, “that they [the government] take into account the small farmer, and provide technical assistance and accessible financing”, and more “support from the state” in general.

Table 1: Characteristics of Surveyed Farmers (N=30)

| | |
|---|------|
| Principal Source of Income (Frequency) | |
| <i>Farm or Livestock</i> | 10 |
| <i>Transfers*</i> | 8 |
| <i>Non Farm labor</i> | 7 |
| <i>Farm Wage Labor</i> | 5 |
| Any farm based income currently or anticipated? | 20 |
| (Frequency) | |
| Average farm size (Median Ha.) | 7 |
| Own Land % (Inherited, bought from IDA or person) | 83.3 |
| Secure Land Tenure % | 73.3 |
| Had previous knowledge of agriculture % | 53.3 |
| Became first time land owner % | 60 |
| Affiliated with an association related to agriculture (Frequency) | 4 |
| Agro ecological practices (Frequency) | 22 |
| Quality of soil (frequency who said very fertile) | 15 |
| Perceive that to live from agriculture has become harder (Frequency) | 24 |
| Want their kids to inherit the farm (Frequency) | 23 |

*Transfers refer to retirement pensions, welfare checks, rent or child support.

Only 1 out of 30 of the farming families captured in the survey participates in the payments for environmental services program although most own forest ranging in area from .5-100 hectares. In other studies, landholders with higher dependence on farm income and non-absentee landowners were associated with the lack of participation in the payments for environmental services program (Morse et al. 2009). Largely negative farmer perceptions presented in the following sections regarding conservation or reforestation on their land via the PES program further validates this potential lack of recruitment of family farmers into that program. In the following profiles, several farmers see enrollment in PES as a loss of control of their land. The Forestry Law of 1996 already extended the reach of the national government onto private land by prohibiting land use change where natural forest occurs. Furthermore, the PES contracts are accompanied with several visits to the property by forestry engineers and do contain a legal easement that remains with the property where the owner transfers the rights of the parcel's potential to reduce greenhouse gas emissions to the national government (see Sanchez-Azofiefa et al. 2007). This may explain, in part the negative perceptions of family farmers regarding conservation or reforestation payments and lack of participation in the PES program.

From these 30 surveyed farmers, we selected farmer profiles (Table 2) to demonstrate the dominant patterns of crops, household characteristics and circumstances evident in the farming population in this region. These profiles are useful to paint the picture of farming in the study region, the challenges farmers face, opportunities they take advantage of and the differences within the farming population among farmers of different crops participating in different markets. In the following sections, each one of these farmer profiles will be discussed in detail in relation to the sector they participate in and compared to other farmers

participating in the same sector and analyzed in contrast to the assumptions inherent in the dominant development discourse discussed in the theoretical framework section.

Table 2: Selected Farmer Profiles Based on Survey and Interview data

| <i>Name</i> | <i>Market Type</i> | <i>Crop</i> | <i>Area in Crop Ha.</i> | <i>Forest-ed Land Ha.</i> | <i>Total Land-holdings Ha.</i> | <i>Monthly Income USD</i> | <i>Income Source</i> | <i>Recipient of PES</i> |
|-------------|--------------------|-----------------------------------|-------------------------|---------------------------|--------------------------------|---------------------------|----------------------|-------------------------|
| San-tiago | Modern | Pineapple (MD2 variety) | 8 | 20 | 40 | 362 | Farm | No |
| Marco | Traditional | Pineapple (Monte Lira variety) | 8 | 0 | 8 | 119 | Farm | No |
| Sergio | Modern | Subsis-tence | 6.5 | 0 | 6.5 | 217 | Off Farm | No |
| Doña Myra | Traditional | Pepper | 1.5 | .5 | 6.5 | 1379 | Non-Farm | Yes, agro-forestry |
| Juan | Traditional | Pepper | 2 | 10 | 22 | 821 | Farm | No |
| Doña Licha | Traditional | Dairy | 6.5 | 46 | 6.5 | 289 | Farm | No |
| Gérman | Traditional | Cattle | 70 | 100 | 170 | 1987 | Non-Farm | No |

The Structure Of Pineapple Production And Commercialization

The pineapple sector in Costa Rica has both a traditional market and modern export market. The export market is only for the MD2 genetic varietal. Within this market, 60% of export goes to the United States and 30% goes to the European Union (Faure et al. 2006). The export market structure is called a bilateral oligopoly (Lee et al. 2013) characterized by a high degree of vertical integration and dominance of a few mega firms. In Costa Rica, two transnational companies indirectly control 85-90% of all pineapple export production, transport and trade (Vagnerorn et al. 2009). To sell to European and American markets, producers must meet GlobalGAP standards as of 2006, for health, worker welfare and environmental sustainability and comply with the Law of Bioterrorism for the United States. In this type of structure, private retailers exert a high amount of control and producers must continually invest to comply with retailers' standards for safety and quality (Lee et al. 2013). In the Huetar Norte region, only 50% of producers have been able to meet these standards primarily due to excessive cost for equipment and inputs, such as fertilizers, pesticides, or seedlings. Due to these high costs, lack of compliance is heavily concentrated in smaller farms under 25 hectares (Faure et. al 2006).

Twenty percent of all pineapple produced in Costa Rica is sold on the national market. These pineapples are primarily older genetic varieties and produced by smaller farms. Producers with less than ten hectares account for 40% of the national production of older varieties (Faure et. al 2006). In these markets, smallholders can either a) sell to local processing or export companies that play a very limited role in the larger value chain, or b) operate solely in the traditional market. Small producers primarily sell to 1) processing firms, for canned,

dehydrated or juice products, 2) at the local markets or 3) to export wholesale packing plants, in that order (Faure et al. 2006).

Pineapple, in large farms, is produced in monocultures at an average density of 72,000 plants per hectare. Such plantations require an average of 1 person's labor for every 2 hectares year round (Villegas et al. 2007). This contributes to startup costs which small holders typically find prohibitive; initial startup costs are a mean average of \$9900 per hectare to produce export quality fruit (Piñero and Díaz Ríos 2007). Yet there are clear cost cutting advantages if pineapple is produced on a large scale; for instance, it costs small producers (>10 hectares) .08 cents to produce a kilo of fruit whereas it costs large agribusinesses just .003 cents (Piñero and Díaz Ríos 2007). Savings for larger companies are due to bulk purchasing of inputs, and threshold investments in machinery, transport and infrastructure for packing and processing.

In the Huetar Norte region, 94% of pineapple producers are characterized as small, cultivating less than ten hectares. However, 77% of the area cultivated in pineapple pertains to only 19 large companies, many of which are subsidiaries of the transnational Del Monte and demonstrate the degree of consolidation of land and production these firms have (Faure et al. 2006). The study region accounts for forty-six percent of the largest companies operating in the Huetar Norte region managing over 6400 hectares of pineapple production. These agribusinesses range from 200-1200 hectares and on average have about 492 hectares under cultivation (Villegas et al. 2007). These high production costs, high risk, and dominance of large holders create a high incentive for smallholders to collectively organize. However the structure of the market is so dominated by agribusinesses that it is limiting of the potentially

positive effects of organizing for smallholders. This is further intensified because the existing producer's organization primarily represents agribusinesses and their interests.

The chamber of pineapple producers (CANAPEP), was founded in 2003 when, as described by a representative,

‘ the sector began to organize to have an impact at a governmental level, to prevent Europe from taking away their trade preferences, so in that moment, the pineapple companies were not organized, therefore they began to organize into small groups, and that is when the chamber was created in order to negotiate with Europe, including inviting representatives of the parliament, they had meetings with the ambassadors, with the government...so in order to negotiate at this level, the sector became unified.’

A key goal of CANAPEP is to gain political power. Pursuit and successful acquisition of political power is a characteristic of this group that differentiates them from other producer organizations demonstrated by their frequent meetings with government officials, as described by a representative, ‘the chamber is a link between agribusinesses and the government, so frequently we meet with all the congressmen (members of parliament).’ CANAPEP's influence is also telling as demonstrated by the following quote: ‘at the level of the chamber, we represent [the producers of] approximately, 85% of the total national land area in pineapple.’ Furthermore, most of their constituents are asset rich large agribusinesses as a Ministry of Agriculture representative explains, ‘more or less, 92% of the pineapple comes from large producers. Only 8% is from small and medium producers. The grand majority of the small and medium producers are not part of CANAPEP, because it is an organization for

large producers.’ The affiliates’ high level of political and financial capital increases the political and financial capital of this group.

CANAPEP has formed inter-governmental institutional alliances and solicits public research, provides key services such as technical manuals and technical assistance, engages in international lobbying, self regulates the sector to address infractions for poor land management practices and organizes litigation on behalf of their constituents. They have essentially replicated the services that the state once provided to the agricultural sector but has withdrawn from due to limited financial and human resources. This type of replication is a characteristic of the neoliberal shift in agriculture that diminishes state resources and fosters the space for private interest groups to provide critical services to a selective group of constituents (Harvey 2005).

In the following section, I will compare 3 different small farmer profiles that are engaged in pineapple production and demonstrate what struggles they face in this modern sector, and what alternatives they find.

Santiago (middle income) is a 35 year old husband, father of two and recent farmer. In 2008, he inherited 40 hectares with his brother where they cultivate 8 hectares of pineapple for export. They began with 1 hectare of pineapple but expanded up to 8 hectares in the last 4 years. On the rest of the land they have 20 hectares of forest and 10 hectares of pasture. They plan to expand their pineapple plantation to 18 hectares in the next ten years and ‘if the business continues well, if it grows, I am going to buy other properties.’ He said, ‘I would like

to cut the forest [to increase hectares of pineapple], but it's too much work and not permitted by law.' In this case, half of his land cannot be cultivated because it is legally protected by the state for conservation. The brothers decided to plant pineapple because of the high prices but complain that the major challenge for farmers today is that the exporters 'do not pay really what the product is worth' and that overproduction is the main determinant of their selling price. They transport their product directly to the packing plant where the best fruits are selected for .75 cents each and about 1% is rejected due to low quality. This lower quality fruit can be sold for about .10 cents to intermediaries for the national market. Monthly, he receives \$362 dollars, all farm-based income, from the sale of about 120,000 fruits per year. He states that 'increases in the price of pineapple' is the principal factor that would improve his economic situation and says that last year was especially bad to the point that they almost quit. When describing why it has become more difficult to make a living from agriculture he describes a simple reproduction squeeze (see Bernstein 2010) where the costs of production are increasing and profits decreasing; 'it's really costly to produce, with expensive inputs and then it's difficult to sell.'

Marco (low income) is an early migrant to the frontier, arriving in 1982, 'out of [economic] necessity and the land was cheap and accessible.' He deforested his own land (8.5 ha.) and for 32 years has produced pineapple. He dedicated his land to pineapple because it 'is a crop that is adapted best to the land I have.' He sells pineapple at the farmers market in San Jose, the capital, for 20 cents a fruit. All of his income, \$119 dollars per month, is farm based, from the sale of 52,000 pineapples a year. He has a covered truck to transport the fruit weekly to the market and a tractor, both non-land critical assets that allow him to cultivate this area and

consistently sell his product directly. He says the prices are better at the farmers market than at the local export wholesalers whose prices are low due to overproduction. Plus, he can trade pineapple at the market for all his subsistence needs. Export production requires high investment and ‘you have to apply strong insecticides and pesticide almost all the time.’ He doesn’t like to use pesticides because he lives on the farm and only is able to purchase them when he has extra income from good harvests.

Sergio (low income) is a Nicaraguan immigrant who came to Costa Rica in 1988, receiving amnesty as a refugee of the Contra war. He worked on the banana plantations for 10 years and in 1999 migrated to Sarapiquí region because of the available land. He owns 6.5 hectares of mixed agriculture and pasture. He has 11 cows and grows 2 hectares of subsistence crops (i.e. corn, cassava, beans). He is 43 years old and supports 6 people. In his opinion, the greatest challenge facing farmers today is that ‘they have to work [off the farm] to survive.’ His livelihood is a clear example of this predicament. Although he has land, he ‘chooses’ to work at a pineapple company as a laborer. He works 12-hour days on a rolling 3-month contract and receives \$217.41 per month.

The pineapple sector is characterized by high production costs, complicated international markets with several links in the value chain. These factors incentivize collective organization. However, the collective organization that exists does not represent the family farm, which has the most structural barriers for participation. Instead it serves to further polarize the sector by concentrating political and financial capital for the interest of agribusinesses who already are enabled in this market structure.

Santiago represents farmers who are precariously trying to compete within the modern markets that are deeply integrated into the global agro-export food system. Such farmers are faced with high production costs, limited autonomy and limited opportunities to move up the value chain. Santiago is the most like the commercial farmer type, as he has larger landholdings, produces intensive crops for export and has been able to invest in mechanization and technology to meet the quality standards for international trade. However, he is struggling to compete and it is clear in his situation that the individual characteristics or farm level characteristics are secondary to his success; his main barriers are overproduction caused by larger companies and his lack of bargaining power with the packing plants.

Marco demonstrates an alternative to this modern market through his participation in the traditional pineapple market. He retains a higher level of autonomy and through direct sale of his product is able to get a consistent, average price point. Despite downstream modernization of the pineapple market, he is isolated from the competition by participating only in the traditional market. He receives a lower price than Santiago's highest price but assumes less risk and production costs. In both Santiago and Marco's cases, critical non-land assets, notably transportation and mechanization capabilities, allow these farmers to produce an intensive crop. Although Marco produces less pineapple on the same amount of land and may look like a traditional or semi-commercial farmer, his marketing techniques are innovative; he can provide a farm-based income through specialization while maintaining the ability to trade for subsistence. Furthermore, the viability of his strategy within just the traditional sector is

clearly durable, as he has continued to produce pineapple despite changing market conditions for 32 years.

Sergio fits the subsistence profile. He represents the indirect impact modern agricultural markets can have on smallholders and the larger regional economy. As smallholders struggle to secure farm-based livelihoods and are excluded or marginally included in modern markets they are pushed by the increasing labor demand stimulated by large-scale modern agricultural production to become a flexible labor force for agribusinesses (Barbier 2012). A singular labor force links the traditional economy and the modern export agriculture economy. Low skilled farmers become the primary labor force for agribusinesses (Ibid.). While this leads to economic diversification, which could be seen as a good thing, in Sergio's case it is a decision made out of necessity rather than an opportunity to supplement his income.

The Structure Of Pepper Production And Commercialization

Pepper (*P. nigrum L.*) production began in 1980s in the study region and is now known as a smallholder crop that has been able to provide a farm based income to support a family.

Pepper is an intensive crop in regards to land, labor and financial capital. The average production is 2458 kg per farmer, per year, grown in an average area of .9 hectares. Start-up costs are about \$2500/ha (Saenz Segura et al. 2010). Pepper takes 2-3 years to establish but the plant is then productive for 8-15 years. Harvests are continual, with incrementally increasing yields beginning at 1.6 tons per ha. in the third year, and reaching 15 tons per ha. in the fifth year (Saenz Segura et al. 2010). The farmers bring their product to wholesalers who set fixed prices two times per year (Saenz Segura et al. 2010). There is a narrow window of

ripeness pepper must be within for commercial viability, and rejections average about 10% of each delivery. The price for a kilogram of pepper ranges from \$1.26 to \$2.71 green or \$0 .90 cents dry (Saenz Segura et al. 2010).

The Association of Pepper Producers (APROPISA) was founded in 2002 because as Coquie, a representative of the organization said, ‘we were losing so much pepper’, indicating there was an incentive to organize, enhance technical knowledge and seek resources to offset the high costs of production. At the time of APROPRISA's formation, their competitor also had a monopoly on the market, providing an incentive for collective bargaining (Sánchez Segura et al. 2012). The organization has evolved over 12 years and the current president attributes its success to significant institutional help in building organizational capacity, providing market research, financial resources and technical expertise. Coquie says, ‘We [APROPISA] already have more than 12 years, so the institutions here know us as being a solid, strong organization...so we have been really supported by the governmental institutions and the universities. They have been at our service, and readily available.’ However, as described by Coquie, their success is predicated on, ‘first and foremost, getting organized, because in order for you to receive help from the state you have to be legally established.’

As the above quote describes, APROPRISA has taken advantage of the administrative structure available to regional farmers' organizations where the Ministry of Agriculture (MAG), the National Production Council, Institute of Agrarian Development (IDA) and other government agencies meet regularly to evaluate formalized farmers organizations and productive projects and where meeting participants decide to provide inter-institutional resources and support to

deserving organizations. The pre-requisite to accessing this state support is becoming formally organized and to present a solid proposal complete with market research and assurances for project viability. As Coquie describes, their initial organization prompted the government to develop a program specifically for pepper production, ‘thanks to the organization, and that APROPISA began to process [pepper] here, our own government now has a specific program for pepper.’

Through becoming a formal organization and soliciting state support, APROPISA is able to essentially subsidize production via coordinated state provided resources to ensure a higher quality product and increase farmer affiliation and satisfaction. The state provides technical assistance; money to purchase inputs distributed in a welfare check, and coordinated inter-institutional support between IDA and MAG to provide infrastructure and target agriculture extension services in IDA settlements. IDA also gave the organization a processing plant and equipment to dry and package the pepper. In this way, APORPISA is able to function as a funnel for state support that has otherwise been withdrawn in the post 1980 era. The group is able to solicit state help in order to subsidize production and make the pepper sector accessible to the family farmer. Furthermore, in regards to market competitiveness, APROPISA operates as a collective bargaining unit to secure a better price with downstream distributors, and sell in quantity to wholesalers on the domestic market.

As demonstrated in the following quote, the impact of pepper on many smallholders has been transformative,

‘When I came here, I came with 13 families. My story is this-- all of my life, I was a manual laborer/landless peasant, until now, thank god, I have land and for the moment she is providing for me because we have pepper. This is my life; I live from this and I have 20 years now working in pepper.’

Regional agricultural representatives are proud of this sector and APROPISA. They believe that APROPISA, as an organization with this product and market, has potential to tangibly improve agrarian livelihoods. Nevertheless, some government officials feel that the pepper is still underexploited by smallholders because of ‘their lack of entrepreneurial vision and willingness to work hard’. As Carlos, a representative of the National Council of Production said,

‘here in Sarapiquí, there is one of the best, most profitable crops, and people don’t take advantage of it, they don’t get it. You know what it is? Pepper. We did a study in 2008 with an NGO from Spain and we found that here you can grow 120 ha. more of pepper and there is a market. And people don’t like it. Why? Because its a lot of work, like gardening, you have to be constantly attending to the crop everyday, but its a really profitable crop.’

Carlos is critical of the lack of individual farmer initiative; however, in the case of pepper, the discussion above demonstrates how critical contextual factors, like the organization’s efforts and state help, heavily condition and enable individual initiative and performance. The following cases demonstrate how profitable this crop is for smallholders and how essential organization has been in securing state resources for smallholders.

Doña Myra (high income) moved to this region in 1990 with her husband and they qualified to purchase a typical Institute of Agrarian Development (IDA) village plot of 6.5 hectares. They form their livelihood through two primary sources of income: 1) her husband's policeman salary (\$777) and 2) pepper production (\$602) per month. They initially learned about pepper through an IDA promotional program. As their health has deteriorated over the years, pepper is a good retirement option. When describing why she chose to grow pepper she says, 'with cassava there is only one harvest a year. Pepper lasts for 8 years and there is a harvest every week.' She claims that she and her husband were the first to try growing pepper, and that now others in the community have started to do the same. To begin planting pepper, her husband took out a loan from the local rural credit institution and was given production advice by a wholesaler's agronomist (not APROPISA affiliated). They lost everything due to poor technical advice and mismanagement of fertilizers and insecticides. The husband had to take out another loan to start over after the crop failed and they are now advised by the Ministry of Agriculture agronomist who visits bimonthly to check on their production and offer technical advice. Currently, they have 3 hectares of cassava, 1.5 ha pepper, .5 ha forest and the rest is residential. Because her husband is away all week for work in the city, Doña Myra tends the pepper. She says, 'It is a very delicate crop... it needs a lot of attention.' They are at maximum labor capability; she has to hire one laborer to help her with the pepper that is harvested daily. Even though APROPISA offers a better selling price, she does not have the transportation required to deliver the pepper to APROPISA's processing plant twice a month. For this reason, she sells to the competitor of APROPISA who picks up the pepper at their doorstep. Because pepper is a vine that is typically grown wrapped around trees (*Erythrina*

poeppegiana), this type of agroforestry system qualifies for the payments for environmental services (PES) program. Doña Myra and her husband are currently receiving payments in their 4th year of the PES contract, and so far have received \$1553.48. She sees the benefits of PES as this, ‘We are harvesting two products; one—pepper and two—trees.’

Juan (high income but due to no current production low income) came from San Carlos in 1984 seeking land. As a low-income migrant upon arrival, he also qualified to purchase 28 hectares from the Institute of Agrarian Development. He deforested 22 hectares of that land for pasture and pepper production. He was one of the original pepper farmers and organizers of APROPISA: ‘because no farmer, under their own resources can get ahead alone...we have to create the future together with organizations.’ He is now 63 year old, and a father of 10 kids who have since moved away. He is now settling into retirement after a long public service career in regional politics. He has been working in community development and as a governmental representative for the past 10 years and had to let his farm fall out of production. His normal income for 2 hectares of pepper is \$821 per month but he is currently in a re-establishment phase, i.e., the 3-year period required to get the crop going again. Consequently, he has no current income. Juan receives state provided welfare payments for inputs (fertilizers and starts) for pepper.

Throughout his years in farming and in politics, Juan has seen a lot of changes. He is afraid agriculture has gotten so hard to make a living from that ‘young people don’t want to work in agriculture anymore, before people used to be accustomed to this kind of work.’ Juan continues, ‘without help they [farmers] are going to disappear’ because ‘the farm doesn’t

sustain.’ He would like to see ‘low interest loans’ for farmers and sees the two biggest challenges are imports and the lack of help from the state in general. When asked why he doesn’t enroll his crop or his remaining forest in the PES program he said, ‘its too much commitment and you lose control of your land.’

The pepper sector represents a traditional marketing system. Although it has specialized wholesalers, the quality standards and post-harvest processing are minimal and the product is sold predominantly on the domestic market. Smallholder production systems, labor availability and smaller landholdings are advantageous to intensive production of this crop. The characteristics of this crop, such as its increasing productivity, daily harvest, and longevity serve to provide consistent income for families and offset the initial startup costs. Moreover, the inter-institutional coordination of state agencies and focus of service distribution targeted in IDA settlements provides added advantages to and decreased transaction costs for smallholder participation. It is evident that state support provides a critical complement to collective organization and facilitates the development of entrepreneurial traits in smallholders, which allows them to be competitive in this market. As such, this serves as an example of a ‘successful’ model for smallholder inclusion. However, its success is very much conditioned by continued state intervention and help and the accessibility and growth potential of the traditional market in practice. Furthermore, the efficacy of the collective organization and the synergy created by the intensive nature of this crop, low land requirements and family labor availability, that in several cases, one of which was demonstrated here, is provided by female producers all contribute to the ability for family farmers to participate and be successful in this sector.

In both of the above cases, the farmers receive income from the non-farming sector and have diversified economically. Doña Myra demonstrates some level of commercial sophistication by qualifying and securing loans, taking the risk to invest in pepper, researching the marketing options, weighing the costs and benefits of this crop and for enrolling in the agroforestry payments. She has been successful in the sense that she is able to almost match her husband's non-farm salary by producing this intensive crop, even despite her limited health status. Juan is lower income at the moment, and is only 'productively' using 2 hectares of his 28-hectare plot and thus perhaps looking more like a traditional or subsistence farmer. However, his insight early on to form APROPISA demonstrates shrewd entrepreneurialism; the organization has benefited commercial and subsistence farmers because it has explicitly addressed the proximate conditions for family farm access and success.

The Structure Of Cattle And Dairy Production And Commercialization

The cattle and dairy sector in Costa Rica is a very accessible sector for all incomes; however, the profitability of this sector for families is highly variable. Profitability depends upon both the rancher's objectives and on the larger national policies and international market for cattle and dairy in Costa Rica, which has changed dramatically since 1980.

The Huetar Norte region has the highest bovine population in the Sarapiquí area and produces the largest contribution of milk and calves in Costa Rica. Farms in the region are of medium size, averaging 35 hectares with approximately 31 head of cattle per farm. The region has the highest percentage of its agricultural land dedicated to pasture in Costa Rica (Holman et al.

2008). In the study region, pasturelands occupy 39% of the land area (Shaver et al. 2014) but pasture is most frequently transitioned into intensive export crop plantations (i.e. pineapple) and most likely to become abandoned and naturally reforested (Fagan et al. 2013) in part because its profitability and competitiveness as a land use has declined in relation to growth in other sectors (i.e. pineapple).

Cattle for beef production are typically sold at regional auctions or directly to rural slaughterhouses. Dairy products are sold directly to clients or, in the case of large operations raw milk is sold to cooperatives, such as Dos Piños. However, in my sample, all dairy-producing households surveyed sold directly to clients. Many cattle farms are small in Costa Rica; about half of the farms are ten hectares or less (Holman et al. 2008). Cattle and dairy production are accessible even to the lowest income populations and operate differently than other agricultural commodities. They can be used as a savings account or as insurance, rather than as income or subsistence generation, as is the case in many other regions around the world (Sibelet and Montzieux 2012). In the survey, 30 households had cattle with an average herd size of 5.5. Another 30 households had an actual savings account, with an average amount of \$307 dollars. However, only 8 households had both a savings account and cattle. This, plus qualitative evidence describing herd size reductions due to unexpected expenses, indicates that cattle ownership and savings accounts are substitutable and do not often occur together. In this sense, the 'productivity' of this sector spans a wider range than in other sectors. Whether productivity is described as "very low" or "very high" depends on the objectives of the rancher. Furthermore, the persistence the extensive 'underproductive' cattle ranch is evident in the study region, and is described in depth in (Edelman 1985).

The cattle organization, AGRIGASA, was formed in 2010, and has 160 active affiliates, who got together, in the words of Don Rios - one of the original organizers, because

‘we gain strength from unity, and if we remain isolated we cannot achieve our goals, but if we are groups that represent the agricultural sector, and all of us are unified-- the spheres of government and institutions pay more attention to us...when there is a situation of market prices, or cattle robbing, we seek help from the government and we are heard...so this is our work to be mediators, to be voices.’

This organization is famous for its charismatic and politically connected leadership but it is debilitated primarily because of the larger political economy of cattle and dairy production in Costa Rica that has been fundamentally transformed.

The cattle industry in Costa Rica has declined steadily since the 1980s, where exports were 27,000 tons to 13,285.1 tons in 2012 (CORFOGA 2013) and as, Don Rios says, ‘Ranching in Costa Rica has collapsed, the famous *hoja amarilla* or yellow sheet,⁵ of international prices from the US, have dropped.’ Since 1980, the percentage of credit for cattle within agricultural loans has declined, exports have decreased and international prices have decreased. The industry is plagued by weak international demand, declining national consumer consumption trends for beef, low technological adoption on farms and slaughterhouses, lack of compliance and capacity to address sanitation issues, and un-competitiveness due to high processing costs and low farm productivity (Holmann et al. 2008, CORFOGA 2013).

⁵ Yellow sheet is a generic name for the Daily Market & News Service’s publication of meat prices for the United States that at one time favored Costa Rican beef.

Trying to improve sanitation practices to meet basic health standards for commercializing dairy products has been a major focus of the producers' organization. Don Rios said,

‘For the past four years, they [the government] have been trying to make each rancher comply with health standards but the conditions here are the most precarious when compared to other regions, in the dairies for example, here, they are the most rustic, directly in the field, they don’t have a platform, or an area to milk the cows...so we intervened so that they could give us some time...’

This assessment of the state of the sector, in comparison to other regions, and with such recent enforcement of basic safety standards indicates this is still predominately a traditional market system. The range of producers and majority of lower income producers presents some challenges to modernizing cattle and dairy production because they are predominately in the middle or lower income class and lack investment capital. For this reason, this organization has focused on securing accessible credit for small and medium producers. Although cattle is notorious for being favored historically in the national banking system (Edelman 1985), since structural adjustment the national banking system has become less accessible and generous.

The change is described in the following quote from Don Rios,

‘the banking environment, used to be easier before, for farmers and ranchers, than now. Now, they have to comply with a lot of requirements, in order for them to get a loan, I can’t say that the bank is not willing to loan money, but the ease that it once had, it no longer has...and loaning money directly to smaller producers, just doesn’t happen.’

This is one issue where there is unanimous agreement across interviews with state officials, organization representatives and surveyed farmers. All claim that the state needs to intervene to provide accessible credit for small and medium farmers and ranchers.

In this context, access to credit or investment capital serves to differentiate producers and polarizes the agricultural sector, as this quote from Don Rios demonstrates,

‘There are three classes of producers; one has all the capabilities there are, he comes to the bank with his land title and says, I want to grow X product, what are the requirements, here is my guarantee, here is my land title, [they say] here take your money— why? Because he knows how to work, he knows where he is going to sell, this is a farmer who gets ahead. After this, is another who is up at 4 am at the welfare center, to see what they will give him... And after that-- the last one, he is kind of on a swing, but he does not know how to get it going, so someone has to come give him a push, from within the institutions in the sector, to give him a little push so he can continue.’

This third type of farmer/rancher is where a representative of AGRIGASA sees the majority of ranchers. He says, what ranchers need is threefold, ‘that ranchers identify/ take more pride in their work, and take advantage of the land better [intensify production] and on the other hand that they can receive resources from the banking system.’

These quotes again affirm the interplay between personal agency and initiative and the need for external state support—both are necessary. Differentiation and polarization within this sector is very evident in the following cases, which describe a wealthy rancher profile, a

representative of the absentee owner and a very precarious dairy farmer profile participating in the same sector.

Doña Licha (low income) is a 40-year-old female who supports her husband, seven children and one grandchild by selling cheese. On 6.5 hectares of land and with 17 cows, she is able to get 7 kilograms of cheese a day, which she sells for \$4 per kilogram directly to her client base and takes a price-cut down a dollar if she has to sell it to an intermediary. Her total monthly income is \$289, including \$91 of welfare payments. She has a truck that she uses to deliver cheese. Doña Licha's reasons for basing her livelihood on cheese production are: 1) its 'easy to sell the product; it is the most stable,' 2) 'every week we have a little bit of money' and 3) 'agriculture is a raffle.' She evaluates her life as 'complicated,' and said that if she had any extra income she would use it to 'cover basic needs,' indicating their precarious standard of living. Doña Licha's family rents a house closer to town so that the kids can go to school and currently have access to 46 hectares of shared forestland where her husband is (illegally) harvesting wood to construct their new home.

Germán (high income) earns his living (\$1,987 monthly from non farm based income including \$903 contributed from his wife) as a semi-retired businessman from San Jose. Both he and his wife are university educated. He is 59 years old with 4 adult children. He grew up spending half his time in Sarapiquí and half in the capital, San Jose. Germán inherited this farm with his 10 siblings, which his family bought in 1938 and 1944. His father always liked cattle, so he continues to dedicate this land to pasture in family tradition. Germán has 3 properties (2 here and 1 in Heredia), with the properties here amounting to 100 hectares of

forest, and 70 hectares of pasture. He has 80 head of cattle, of which, he sells about 20 cows a year for \$361.27 each. He hires no labor. He sees ‘competition with foreign cattle’ as the primary thing that influences the price he gets for cattle. They have to sell 2-3 cows a year to cover operating costs but anything beyond that is all profit. Germán mentioned that he has considered enlisting his property into PES because it could cover the property taxes and he figures he could get about \$6000.00. However, he does cut his forest and he doesn’t want to pay for all the visits by the forest engineers. He says, ‘you can’t touch your own forest if you enroll.’ His siblings want to be bought out of the farm property and the future of this family farm is uncertain. Germán is actively seeking tourism investment opportunities (i.e. horseback riding, motocross etc.) to develop on the farm, and he is thinking about selling some of his land to buy more pasture or to invest in growing pepper.

Cattle and dairy production have low transaction costs for market participation characterized by basic standards and direct sale to clients for dairy products or indirect, centralized sale at auctions for beef or cattle for fattening. This market accessibility reduces incentives for collective organizing and action. The producer’s organization’s efficacy is undermined in this context and its ability to influence change is debilitated by the lack of state support (i.e., subsidies and accessible credit) and the international political economy of cattle production and trade that no longer favors Costa Rican beef. Cheese or milk can be produced with very rudimentary equipment, is highly perishable and difficult to get in remote rural regions. Direct, client based marketing is accessible to smallholders, facilitates immediate delivery of the perishable product and provides for a daily farm based income. In this traditional market, cattle ownership is accessible to even the lowest income populations and is seen in big herds,

most commonly, as a rich man's hobby or way to maintain land use rights and avoid natural forest regeneration into pastureland rather than a major income generating enterprise.

Doña Licha represents small dairy ranchers. As such, she fits the traditional, semi-commercial profile, producing in rustic conditions, with minimal but consistent opportunity to earn farm-based income. However, she has taken advantage of the market accessibility, runs an intensive dairy farm and capitalizes on the daily production to provide a consistent farm based income.

Germán represents the wealthy semi-absentee landowner common to this region. He has large landholdings, secured early on in the settlement of this region, and is engaged in ranching as a marginally profitable supplementary economic activity but principally for cultural or land maintenance reasons. He has several of the higher income, education, and landholding characteristics of a commercial farmer but he runs an extensive ranch, primarily for non-economic cultural reasons.

Conclusion

The corporate food regime has served to more deeply integrate Costa Rican farmers into the global economy, has driven exclusivity and market modernization, particularly of non-traditional export crops like pineapple, and is related to increased international competition and the lack of state support for traditional sectors like cattle and dairy. However, our data show that smallholder family farmers in the Sarapiquí region are persisting and in some cases, like pepper producers, are prospering, relative to other sectors, while not participating at all in

modern markets. Furthermore, the existence of producer organizations in the pineapple, pepper, and cattle sectors, despite their varying level of success in reaching their goals, demonstrates that farmers are actively resisting exclusion, fighting for vitality and trying to find alternatives through collective organization. There are, however, clear tradeoffs between traditional and modern markets regarding risk, consistency and production costs.

Our data indicates that pineapple production entails high risk but can result in a high reward, especially at a large scale of production. Pepper has high production costs but consistent production, significant state support and a secured sale. Collective organization has been transformational in the pepper sector in providing access to family farmers whereas in the pineapple sector collective organization has served to concentrate political and financial capital that disempowers family farmers. Finally, cattle and dairy production are marginally profitable but characterized by easy market access, daily income and low technical requirements, which benefit and provide access to family ranchers but do not incentivize collective organization. In this case, the larger political disinvestment and traditional market for cattle in Costa Rica constrains this industry from being more profitable or productive when compared to historic trends but also is one of the principal reasons it is accessible to family farms.

Effective group organization can create opportunities for smallholders that serve to sustain farm earnings and the families that depend on them, especially if the organizations are supported by an institutional support framework, a growing accessible market and crop characteristics that favor smallholder production. Furthermore, this research demonstrates that

traditional markets provide a needed space to generate farm-based income and support agrarian livelihoods in the face of a rapidly modernizing agricultural sector and the global context of the corporate food regime.

This research supports assertions that the role of the state in politically supporting and financing family agriculture and the role of the family farm must be reconsidered as fundamental to addressing rural poverty and promoting economic development in frontier regions because it is a critical livelihood strategy for the rural poor. Furthermore, this research illustrates the multitude of factors that need to be considered to effectively evaluate the accessibility of markets to family farmers. These factors must be considered within the specific locale and sector in order to fully understand what factors within each sector empower family farms and allow for their future existence and prosperity.

References

- Barbier, E. 2012. "Scarcity, Frontiers and Development." *The Geographic Journal* 178 (2): 110-122.
- Barrientos, O., Porras, S., 2010. Sector agropecuario cadena producción de piña. Políticas y acciones. Secretaría Ejecutiva de Planificación Sectoral Agropecuaria (SEPSA). Ministerio de Agricultura y Ganadería (MAG), San José, Costa Rica.
- Berdegú, J. A., F. Balsevich, L. Flores, and T. Reardon. 2005. "Central American Supermarkets' Private Standards of Quality and Safety in Procurement of Fresh Fruits and Vegetables." *Food Policy* 30 (3): 254–269.
- Berdegú, J. A., and R. Fuentealba. 2011. *Latin America: The State of Smallholders in Agriculture*. A paper presented at the IFAD Conference on New Directions for Smallholder Agriculture 24-25 January, 2011, Rome: IFAD.
- Bernstein, H. 2010. *Class Dynamics of Agrarian Change*. Halifax, N.S.: Fernwood Publishing Company.
- Borras, S. M. 2009. "Agrarian Change and Peasant Studies: Changes, Continuities and Challenges – an Introduction." *Journal of Peasant Studies* 36 (1): 5–31.
- Birner, R. and A. Resnick. 2010. "The Political Economy of Policies for Smallholder Agriculture." *World Development* 38 (10): 1442-1452.

- Brockett, C. D. 1998. *Land, power, and poverty: agrarian transformation and political conflict in Central America*. Boulder: Westview Press.
- Carletto, C., A. Kirk, P. Winters, B. Davis. 2010. "Globalization and Smallholder: The Adoption, Diffusion and Welfare Impact of Non-Traditional Export Crops in Guatemala". *World Development* 38 (6): 814-827.
- Challies, E. and W. Murray. 2011. "The Interaction of Global Value Chains and Rural Livelihoods: The Case of Smallholder Raspberry Growers in Chile." *Journal of Agrarian Change* 11 (1): 29-59.
- Chambers, R., Pacey, A. and Thrupp, L.A. (eds) 1989. *Farmer First - Farmer Innovation and Agricultural Research*. London: Intermediate Technology Publications.
- Conroy, M. E., D. Murray, and P. Rosset. 1996. *A Cautionary Tale: Failed US Development Policy in Central America*. Boulder : Lynne Rienner Publishers.
- CORFOGA 2013. Diagnóstico del Sector Cárnico Bovino de Costa Rica. CORFOGA. San José: Corporación Ganadería. [Accessed online]
www.corfoga.org/pdf/estadist/diagnostico_costa_rica.pdf
- Creswell, John W. 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 3rd ed. Thousand Oaks, CA: Sage Publications.
- Cruz, M. C., C. Meyer, R. Repetto, and R. Woodward. 1992. *Population growth, poverty,*

and environmental stress: frontier migration in the Philippines and Costa Rica. World Resources Institute.

De Janvry, A. 2010. "Agriculture For Development: New Paradigm And Options For Success." *Agricultural Economics*. 41 (S1):17-36.

Eakin, H., J. Bausch and S. Sweeney. 2014. "Agrarian Winners of Neoliberal Reform: The 'Maize Boom' of Sinaloa, Mexico." *Journal of Agrarian Change* 14 (1): 26-51.

Edelman, M. 1985a. "Extensive Land Use and the Logic of the Latifundio: A Case Study in Guanacaste Province, Costa Rica." *Human Ecology* 13 (2): 153–185.

Edelman, M. 1999b. *Peasants Against Globalization: Rural Social Movements in Costa Rica*. Stanford, CA: Stanford University Press.

Ellis, F., and S. Biggs. 2001. "Evolving Themes in Rural Development 1950s-2000s." *Development Policy Review* 19 (4): 437-448.

Escobal, J., D. Caverro. 2012. "Transaction Costs, Institutional Arrangements and Inequality Outcomes: Potato Marketing by Small Producers in Rural Peru." *World Development* 40 (2): 329-341.

Fagan, M.E., DeFries, R.S., Sesnie, S.E., Arroyo, S.P., Walker, W., Soto, C., Chazdon, R.L., Sanchún, A., 2013. Land cover dynamics following a deforestation ban in northern Costa Rica. *Environmental Research Letters* 8.

- Faure, G. and M. Samper. 2004. "Veinte Años de Apertura Económica: El Provenir Comprometido de la Agricultura Familiar en el Norte De Costa Rica." *Anuario de Estudio Centroamericanos*, Universidad de Costa Rica 30 (1-2): 7-26.
- Faure, G., S. Veerabadren, and H. Hocde. 2006. "La Agricultura Familiar Bajo Normas Y Exigencias de Certificación: Podrán Los Pequeños Productores de Piña de Costa Rica Afrontar El Reto ?" *Encuentros: Revista Centroamericana de Ciencias Sociales* 3 (2): 95–115.
- Faure G., and Meneses D. 2005. Las fincas en la región Huetar Norte: una evaluación de las condiciones actuales de las fincas de las familias campesinas, in Samper, Mario (ed.), *Trayectorias y disyuntivas del agro en la Zona Norte de Costa Rica*. San José, Costa Rica: Instituto de Investigaciones Sociales, Universidad de Costa Rita, y CIRAD 79-92.
- Fernandez Arias, M. 2004. *La agricultura costarricense ante la globalización, las nuevas reglas del comercio internacional y su impacto en el agro*. San Jose: Editorial de la Universidad de Costa Rica.
- Fold, N. and Gough, K.V., 2008. From smallholders to transnationals: The impact of changing consumer preferences in the EU on Ghana's pineapple sector. *Geoforum* 39: 1687-1697.
- Grossman, L. S. 1998. *The Political Ecology of Bananas: Contract Farming, Peasants, and Agrarian Change in the Eastern Caribbean*. University of North Carolina Press.

- Gwynne, R. and C. Kay. 2004. *Latin America transformed: globalization and modernity*, second edition. London: Arnold.
- Harvey, C. A., Komar, O., Chazdon, R., Ferguson, B.G., Finegan, B., Griffith, D.M., Martínez-Ramos, M., Morales, H., Nigh, R., Soto-Pinto, L., Van Breuge, M., Wishnie, M., 2008. Integrating agricultural landscapes with biodiversity conservation in the Mesoamerican hotspot. *Conservation Biology* 22: 8-15.
- Harvey, D. 2005. *A Brief History of Neoliberalism*. New York, NY: Oxford University Press Inc.
- Hecht, S. 2010. "The New Rurality: Globalization, Peasants and the Paradoxes of Landscapes." *Land Use Policy* 27 (2): 161–169.
- Hellin, J., M. Lundy, and M. Meijer. 2009. "Farmer Organization, Collective Action and Market Access in Meso-America." *Food Policy* 34 (1): 16–22.
- Holmann, F., Rivas, L., Pérez, E., Castro, C., Schuetz, P., Rodríguez, J., 2008: The beef chain in Costa Rica: Identifying critical issues for promoting its modernization, efficiency, and competitiveness. *Livestock Research for Rural Development* 20 (51). Retrieved June 26, 2014, from [online] URL:<http://www.lrrd.org/lrrd20/4/holmb20051.htm>.
- Holdridge, L.R., Grenke, W.G., Haheway, W.H., Liang, T., Tosi, J.J.A., 1975. *Forest environments in tropical life zones*. Pergamon Press, New York, NY
- Kay, C. 2008. "Focus Reflections on Latin American Rural Studies in the Neoliberal Globalization Period : A New Rurality ?" *Development and Change* 39 (6): 915–943.

- Kull, C., C. K. Ibrahim, and T. C. Meredith. 2007. "Tropical Forest Transitions and Globalization: Neo-Liberalism, Migration, Tourism, and International Conservation Agendas." *Society & Natural Resources* 20 (8): 723-737
- Lee, J., G. Gereffi, and J. Beauvais. 2012. "Global Value Chains and Agrifood Standards: Challenges and Possibilities for Smallholders in Developing Countries." *Proceedings of the National Academy of Sciences of the United States of America* 109 (31): 12326–12331.
- Lee, S. 2010. "The Ties Made in the Harvest : Nicaraguan Farm-worker Networks in Costa Rica ' s Agricultural Exports." *Journal of Agrarian Change* 10 (4): 510-536.
- Markelova, H., R. Meinzen-Dick, J. Hellin, and S. Dohrn. 2009. "Collective Action for Smallholder Market Access." *Food Policy* 34 (1): 1–7.
- Massey, D. S. 1987. "The Ethnosurvey in Theory and Practice." *International Migration Review* 21 (4): 1498–1522.
- Massey, D. S., and R. Zenteno. 2000. "A Validation of the Ethnosurvey: The Case of Mexico-U.S. Migration." *International Migration Review* 34 (3).
- McMichael, P.a. 2005. "Global Development and the Corporate Food Regime." In *New Directions in the Sociology of Global Development*, edited by Frederick H Buttel and Philip McMichael, 11: 269–303.
- McMichael, P.b. 2009. "A Food Regime Genealogy." *Journal of Peasant Studies* 36 (1): 139–169.

- Morse, W., J. L. Schedlbauer, S. E. Sesnie, B. Finegan, C. A. Harvey, S. J. Hollenhorst, K. L. Kavanagh, D. Stoian, and J. D. Wulforst. 2009. "Consequences of Environmental Service Payments for Forest Retention and Recruitment in a Costa Rican Biological Corridor." *Ecology and Society* 14 (1): 23.
- Nystrom, G. E. and G. W. Haverstock. (eds.) 1966. *The Alliance for Progress: Key to Latin America's Development*. New Jersey: D. Van Nostrand Company, Inc.
- Pechlaner, G., and G. Otero. 2010. "The Neoliberal Food Regime: Neoregulation and the New Division of Labor in North America." *Rural Sociology* 75 (2): 179–208.
- Piñero, M., Díaz Ríos, L.B., 2007. Implementation of good practices in the production of fresh pineapples for export: Case study of the Huetar Norte region, Costa Rica. In: Piñero, M., Díaz Ríos, L.B. (eds.), *Implementing programs to improve safety and quality in fruit and vegetable supply chains: benefits and drawbacks*. Latin American case studies. Food and Agriculture Organization of the United Nations, Rome, Italy: 62-73.
- Reardon, T., C. B. Barrett, J.A. Berdegúe, and J.F.M. Swinnen. 2009. "Agrifood Industry Transformation and Small Farmers in Developing Countries." *World Development* 37 (11): 1717–1727.
- Reardon, T., and L. Flores. 2006. "Viewpoint: 'Customized Competitiveness' Strategies for Horticultural Exporters – Central America Focus with Lessons from and for Other Regions." *Food Policy* 31 (6): 483–503.

- Rodriguez, A. and J. Avnedaño 2005. “Empleo agropecuario y cambios socio-ocupacionales en la Región Huetar Norte. 1984-2000” in Samper, Mario (ed.), *Trayectorias y disyuntivas del agro en la Zona Norte de Costa Rica*. San José, Costa Rica: Instituto de Investigaciones Sociales, Universidad de Costa Rica, y CIRAD 79-92.
- Ruben, R., and F. Sáenz. 2008. “Farmers, Markets and Contracts: Chain Integration of Smallholder Producers in Costa Rica.” *Revista Europea de Estudios Latinamericanos Y Del Caribe* (85): 61–80.
- Sáenz-Segura, F., M. D’Haese, and R. Schipper. 2010. “ A seasonal model of contracts between a monopsonistic processor and smallholder pepper producers in Costa Rica”. *Agricultural Systems* 103: 10-20.
- Sánchez-Azofeifa A. A. Pfaff, J. Andres Robalino and J. P. Boomhower. 2007. Costa Ric’a Payment for Environmental Services Program: Intention, Implementation, and Impact. *Conservation Biology* 21 (5): 1165-1173.
- Schelhas, J., Sánchez-Azofeifa, G.A., 2006. Post-frontier forest change adjacent to Braulio Carrillo National Park, Costa Rica. *Human Ecology* 34: 408-431.
- Sesnie, S., Finegan, B., Gessler, P., Ramos, Z., 2009. Landscape-scale environmental and floristic variation in Costa Rican old-growth rain forest remnants. *Biotropica* 4, 16-26.
- SEPSA/MAG 2011, *Política de estado para el sector agroalimentario y el desarrollo rural costarricense 2010-2021*. San Jose, Costa Rica. Secretaría Ejecutiva de Planificación Sectorial Agropecuaria.

- Seuneke, P., T. Lans, and J. S.C. Wiskerke. 2013. "Moving beyond Entrepreneurial Skills: Key Factors Driving Entrepreneurial Learning in Multifunctional Agriculture." *Journal of Rural Studies* 32: 208–219.
- Sibelet, N., Montzieux, M., 2012. Les facteurs de résilience de la caféiculture au Kenya : de la sécurisation alimentaire à la retraite. In : Cahiers agricultures 21 (2-3): 179-191.
- Sick, Deborah. 1998. "Property, Power , and the Political Economy of Farming Households in Costa Rica." *Human Ecology* 26 (2): 189–212.
- Solano, C, León, H. Pérez, E. Herrero, M. 2001. "Characterizing Objective Profiles of Costa Rican Dairy Farmers." *Agricultural Systems* 67: 153-179.
- Sollins, P., Sancho, F., Mata, R., Sanford, R.L., 1994. "Soils and soil process research.: In: McDade, L.A., Bawa, K.S., Hespeneide H.A., Hartshorn G.S. (eds.), *La Selva: Ecology and natural history of a Neotropical rain forest*. University of Chicago Press, Chicago, IL pp. 34–53.
- Thrupp, L. A. 1995. *Bittersweet Harvests for Global Supermarkets: Challenges in Latin America's Agricultural Export Boom*. Washington D.C.: World Resources Institute.
- Vagneron, I., G. Faure, and D. Loeillet. 2009. "Is There a Pilot in the Chain? Identifying the Key Drivers of Change in the Fresh Pineapple Sector." *Food Policy* 34 (5): 437–446.
- Villegas, O., Vargas, F., Pérez, J.A., García, R., Porras, S., Meneses, D., Quesada, A., Delgado, G., Alpizar, D., Mora, B., León, R., Alfaro, D., 2007. Caracterización y plan de acción para el desarrollo de la agrocadena de piña en la región Huetar Norte.

Ministerio de Agricultura y Ganadería (MAG). Dirección Regional Huetar Norte.
Ciudad Quesada, Costa Rica.

Appendix A: Verbal Consent Script
English and Spanish Versions

English Version: *Verbal informed consent protocol for household surveys and semi-structured interviews*

My name is Irene Shaver, I am a doctoral student at CATIE. I am developing my dissertation. Before starting I want to clarify some important aspects:

- Your participation in this interview/survey is totally voluntary
- Your responses are anonymous
- At any moment if you feel uncomfortable and do not want to continue, please let me know.
- If you desire additional explanation please tell me and I will be glad to address your concern.
- I will take notes and record our interview only for the purpose of not losing any information and so that I can analyze it. I hope that this does not make you uncomfortable but if it does, please let me know.

This interview is a part of a study that has several phases where the objective is to better understand what factors affect the decision making process behind land use, how you survive here and make a living, and the process of emigration (for initial settlement/for work) and foreign migration in this frontier region. I will ask questions regarding your daily life, your family, your income and economic activities, your system of production and your land use and migration history.

We are in a time of many changes, social and environmental, some more abrupt, others more gradual, and we are interested in how agricultural and forestry producers react to these changes, what are their strengths and how do they use their opportunities, and what relationships they have with the natural environment. The results (generalized and anonymous) will be discussed in workshops with you and with experts in the field of development and we will try to identify strategies that could help this community better prepare for future changes. If you do not want your data included in the workshops, you can request that. Also, of course your participation in the workshop is completely voluntary as well. I will ask if you are willing to participate in the workshop after the interview when you understand better the sensitivity of the information I will collect.

After this interview, more or less between February and June in 2012, we are organizing workshops to discuss and refine the results, and to discuss possible strategies to accomplish your vision of the future.

I would like you to tell me if you would like to participate as an indication that I have explained the purpose of the interview and you consent to participate.

Spanish Version: *Protocolo de consentimiento a participar de encuestas y entrevistas semi-estructuradas familiares.*

Mi nombre es Irene Shaver, soy estudiante de Doctorada del Centro Agronómico Tropical de Investigación y Enseñanza-CATIE, estoy desarrollando mi disertación.

Antes de iniciar deseo aclararle algunos aspectos importantes:

- Su participación en esta entrevista/encuesta es totalmente voluntaria.
- Sus respuestas son anónimas.
- Si en algún momento se incomoda y no quiere continuar, por favor me lo hace saber.
- Si desea alguna explicación adicional por favor no dude en preguntarme.
- Tomaremos notas (fotos y/o grabación) de nuestra entrevista para no perder la información y poderla analizar, esperamos que esto no le incomode, si le incomoda, por favor me lo hace saber.

La entrevista forma parte de un estudio que tiene varias fases y que tiene como objetivo entender mejor cuáles son los factores que afectan el proceso de toma de decisión por parte de ustedes sobre el uso de la tierra, como ustedes subieren y ganan una vida aquí, y el proceso de emigración (para llegar aquí y para trabajar) y migración de extranjeros en esta zona fronteriza. Yo voy a preguntar de su vida diaria, su familia, de sus ingresos y actividades económicas, su sistema de producción y de su historia de uso de la tierra y migración.

Estamos en una época de muchos cambios, social y ambiental, algunos graduales otros más bruscos, y nos interesa conocer como en general productores agropecuarios y forestales reaccionen ante estos cambios, cuáles son sus fortalezas y como utilizan sus oportunidades, además de cuáles relaciones reconozcan con su entorno. Los resultados (generalizada y anónimas) serán discutidos en talleres con ustedes y con expertos en el tema de desarrollo y trataremos con ustedes definir estrategias que les podría ayudar a prepararse mejor para futuros cambios.

Después de esta entrevista, más o menos entre enero y junio de 2012, organizaremos un taller para discutir y afinar los resultados, y para discutir posibles estrategias para lograr un futuro como ustedes mismos lo ven. Si usted no quiere sus datos incluyendo en el taller, usted puede que me diga lo y por supuesto su participación en el taller es totalmente voluntario también. Yo voy a preguntar después la entrevista si usted quiere participar en el taller cuando usted entiende más como la sensibilidad de la información.

Me gustaría que usted me diga si quiere participar como indicación que le he explicado el propósito de la entrevista y su consentimiento a participar en ella.

Appendix B: Consent Form For Video Recording Of Community Workshops

Vamos a tomar vídeo del proceso. Los video son solamente para nosotros para analizar el procesos y para identificar temas y resultados claves. Vamos a presentar los resultados de todos los comunidades, sin los nombres o las características que identifican, a ustedes cuando todo está terminando.

Antes de iniciar deseamos aclararle algunos aspectos importantes:

- Su participación en esta taller es totalmente voluntaria.
- Si en algún momento se incomoda y no quiere continuar, por favor me lo hace saber.
- Si desea alguna explicación adicional por favor no dude en preguntarme.
- Tomaremos vídeo, notas (fotos y/o grabación) de nuestra taller para no perder la información y poderla analizar, esperamos que esto no le incomode, si le incomoda, por favor me lo hace saber.
- Los vídeos sólo será visto por Renée y yo, y vamos a mantenerlos con confidencialidad.

Me gustaría que usted firme aquí si quiere participar como indicación que les he explicado el propósito del taller y su consentimiento a participar en ello y que se filmará.

Quiero participar y pueden filmar mi participación.

Nombre: _____

Firma: _____

Appendix C: Survey

Región _____ Cerca de cuál comunidad _____
 Número de la casa _____ Fecha _____
 Entrevistado por _____

Aspectos socioeconómicos

- 1.- ¿Qué edad tienen usted? _____ Años
- 2.- ¿Cual es su estado civil? (1)-soltero ____ (2)-casado ____ (3)-viudo ____
 (4)-unión libre ____ (5) Divorciado _____
- 3.- ¿Cuántas personas viven en la casa actualmente? _____
- 4.- ¿Quiénes viven en la casa? _____

- 5.- ¿Tiene más hijos que no vivan en esta casa? _____ ¿Cuántos? _____
- 6.- ¿Cuántas personas menores de 16 años viven en casa _____
- 7.- ¿Cuántas personas mayores de 65 años viven en casa _____
- 8.- ¿Quiénes de esta casa estudian actualmente? _____
- 9.- ¿Cuantos hijos y cuantas hijas es un número ideal para una familia? _____
- 10.- ¿Cuál es su nivel de escolaridad?
 (1) Primaria _____ (2) Secundaria _____ (3) Universidad _____ (4) no asistió _____
- 11.- ¿Cuál es el nivel de escolaridad de su esposa(o)?
 (1) Primaria _____ (2) Secundaria _____ (3) Universidad _____ (4) no asistió _____
En el caso que no asistió a la escuela,
 12.- ¿Sabe leer y escribir? Si _____ No _____
- 13.- ¿Usted a que se dedica? _____

- 14.- ¿Cuál es su ingreso económico mensual? _____
- 15.- ¿Qué o cuáles actividades económicas determinan sus ingresos? _____

- 16.- ¿Cuál es el porcentaje de sus gastos mensuales? _____
- 17.- ¿A qué hora sale a trabajar en la mañana? _____
- 18.- ¿A qué hora regresa a la casa? _____
- 19.- ¿Cuántos días trabaja durante la semana? _____

20.- ¿Hay otras personas que contribuyen a los ingresos económicos de la casa?

Si _____ No _____ **Si la respuesta es “Si”,**

21.- ¿Con que frecuencia lo hacen? _____

22.- ¿Con cuanto dinero contribuyen? _____

23.- ¿Hay actividades que hagan algunos miembros del hogar por los cuales no les paguen o sean voluntarios? Si _____ No _____

Si es trabajador agrícola: agricultor, jornalero o capataz

24.- ¿Quién es el dueño de la finca donde trabaja?

(1)- Propia _____ (2)- Una compañía _____ (3)-Es empleado de otra persona (4) otro, especifique _____

Pasar pregunta 27

Especificar que compañía _____

Si es administrador

25.- ¿Quién toma la mayoría de las decisiones sobre qué y cómo cultivar en la finca?

(1)- Usted mismo _____ (2)- Las personas que lo emplean _____ (3)- Otro _____

26.- ¿Quién toma las decisiones financieras de la finca?

(1)-Usted mismo _____ (2)-Las personas que lo emplean _____ (3)-Otro, especifique _____

27.- ¿Tiene alguno de estos bienes?

(1)-agua potable (especificar de pozo, de acueducto) _____ (2)-electricidad _____ (3)-cocina eléctrica o de gas _____ (4)- carro _____ (5)- bicicleta _____ (6)-Televisión _____ (7)-sistema de cable _____ (8)-computadora _____ (9)-tractor/chapulín _____ (10)-teléfono celular _____ (11)-lavadora de ropa _____ (12)-tanque séptico _____ (13)-Herramientas: (ejemplos: motoguadaña, hacha) _____ (14)-cuenta bancaria _____

28.- ¿Usted cuenta con los siguientes servicios?

(1)-Seguridad social (Caja) _____ (2)-Ayuda de IMAS _____ (3)-becas escolares para los niños _____ (4)-Pensión _____ (5)- Capacitaciones de INAS _____ (6)- Acceso a créditos bancarios _____ (7)- asistencia técnica (agrícola) _____ (8)- Hipoteca _____

En caso de opción:

(2) Ayuda de IMAS, especificar _____

(5)Capacitaciones de INAS, especificar _____

(7)Asistencia técnica (agrícola), especificar _____

29.- ¿Tiene usted alguna deuda? Si _____ No _____ **Si la respuesta es “Si”,**

30.- ¿De cuanto es su deuda? _____

31.- ¿Tiene ahorros? Si _____ No _____

32.- ¿Cuánto tiene ahorrado? _____

33.- ¿Como evalúa su condición de vida actual? _____

34.- ¿Como puede usted mejorar sus situación económica? _____

35. Si usted ganará 2, 000,000 de colones el día de mañana, en que lo invertiría?

Región _____ Cerca de cuál comunidad _____
 Número de la casa _____ Fecha _____

Encuesta de demografía y migración

1.- ¿De dónde son sus papás?

*Costa Rica

De que Pueblo _____

De que Distrito _____

De que Cantón _____

*Nicaragua

De que Pueblo _____

De que Municipio _____

De que Departamento _____

Otro: _____

2.- ¿Cuál es su nacionalidad?

(1) Costarricense ____ (2) Nicaragüense ____ (3) Otro, especifique _____

3.- ¿Cuál es la nacionalidad de su esposa?

(1) Costarricense ____ (2) Nicaragüense ____ (3) Otro, especifique _____

4.- ¿Usted ha vivido siempre aquí? Si ____ No ____

Si la respuesta es "No"

5.- ¿En qué año vino a vivir aquí? _____

Si la respuesta es sí, él/ella ha terminado con esta sección, pasar a la pregunta 18

6.- ¿Antes de vivir aquí, dónde vivió?

Costa Rica

De que Pueblo _____

De que Distrito _____

De que Cantón _____

Nicaragua

De que Pueblo _____

De que Municipio _____

De que Departamento _____

Otro: _____

7.- ¿Dónde usted vivió antes, es un lugar:

Rural ____ Urbano ____

8.- ¿Por qué vino a vivir aquí en vez de quedarse en su lugar de origen?

(1)- Tierra ____ (2)- Trabajo ____ (3)- Guerra ____ (4)- Políticas migratoria (Amnistía)
 ____ (5)- Desastres naturales ____ (6)- Cambio de residencia ____ (7)- Estudios

_____ (8)- De aquí es mi esposo/a _____ (9)-Otra razón, especifique:

9.- ¿Conocía a personas de esta zona antes de llegar aquí? Si _____ No _____

Si la respuesta es “No” Pasar a la pregunta 13

Si la respuesta es “Sí”,

10.- ¿Cuál era la relación con ellos

(1)- Familia cercana _____ (2)- Familia lejana _____ (3)- Amigo/a _____
 (4)- Conocido _____ (5)- Conocido de conocidos _____ (6)- Otro (especificar) _____

11.- Esta (s) persona (s) le fue (ron) de ayuda para establecerse aquí? Si _____ No _____

Si la respuesta es “Sí”,

12.- ¿Que tipo de ayuda?

(1)- Hospedaje _____ (2)- Contactos _____ (3)- Trabajo _____ (4)- Dinero _____
 (5)-Otro (especificar) _____

Información sobre el origen:

13.- ¿Tenía su propia tierra en su lugar de origen? Si _____ No _____

Si la respuesta es “Sí”,

14.- ¿Cuántas en hectáreas _____

15.- ¿Qué trabajo consigo cuando llegó aquí?

(1)- Negocios _____ (2)- empleada doméstica _____ (3)- agricultor _____
 (4)- turismo _____ (5)- empaedora _____ (6)- oficina _____ (7)- ama de casa _____ (8)-
 administrador _____ (9)- jornalero _____ (10) otro, especifique:

16.- ¿Ha mejorado su situación de vida desde que usted llegó aquí? Si _____ No _____

17.- ¿Cómo? _____

Migración Histórica

18.- En el pasado, usted ha migrado a otro país? Si _____ No _____ **Pasar pregunta 24**

19.- ¿Dónde? _____

20.- ¿A qué se dedicaba? _____

21.- ¿Por qué migro?

(1)- Tierra _____ (2)-Fin de temporada en agricultura _____ (3)- Mejor empleo en el lugar de
 destino _____ (4)- Estudios _____ (5)- Familia _____ (6)- Otro (especificar) _____

22.- ¿Con quien se alojo?

(1)- Solo _____ (2)- Con algún familiar (especificar) _____ (3)- Con amigos _____
 (4)- Núcleo familiar propio _____ Otro (especificar) _____

Con algún familiar (especificar):

23.- ¿Usted enviaba dinero (remesas) para acá? Si _____ No _____

Si la respuesta es “No” Pasar pregunta 26

Si la respuesta es “Sí”,

24.- Con que frecuencia es el envío _____

25.- Qué cantidad le envían _____

Presente y Futura Migración para todas

26.- ¿Algún familiar que haya vivido en esta casa, actualmente vive en otro lugar en Costa Rica? Si _____ No _____ **Si la respuesta es “No” Pasar a pregunta 32**

27.- ¿A dónde?

Que Pueblo _____

De que Distrito _____

De que Cantón _____

28.- ¿Por qué migro?

(1)- Tierra _____ (2)-Fin de temporada en agricultura _____ (3)- Mejor empleo en el lugar de destino _____ (4)- Estudios _____ (5)- Familia _____ (6)- Otro (especificar) _____

29.- ¿Trabajan allá? Si _____ No _____

30.- ¿De quién o dónde consiguió el dinero para viajar?

(1)- Su propio dinero _____ (2)- Dinero de la familia _____ (3)- Préstamo _____

(4)-Vendió su tierra _____ (5)- Vendió alguna otra cosa _____ (6)- Otro, especifique _____

31.- ¿ Con quien se aloja?

(1)- Solo _____ (2)- Con algún familiar (especificar) _____ (3)- Con amigos _____

(4)- Núcleo familiar propio _____ Otro (especificar) _____

Con algún familiar (especificar):

32.-¿Hay algún familiar de esta casa que haya migrado **fuera** de Costa Rica?

Si _____ No _____ **Si la respuesta es “No” Pasar pregunta 43**

33.- ¿A dónde migraron? Especifique _____

34.- ¿Por qué?

(1)- Tierra _____ (2)-Fin de temporada en agricultura _____ (3)- Mejor empleo en el lugar de destino _____ (4)-Estudios _____ (5)- Familia _____ (6)- Otro (especificar) _____

35.- ¿Trabajan allá? Si _____ No _____ **Si la respuesta es “Si”**

36.- En qué trabaja? _____

37.- ¿De dónde o quién consiguió el dinero para viajar?

(1)- Su propio dinero _____ (2)- Dinero de la familia _____ (3)- Préstamo _____
(4)-Vendió su tierra _____ (5)- Vendió alguna otra cosa _____ (6)- Otro, especifique _____

38.- ¿ Con quien se aloja?

(1)- Solo _____ (2)- Con algún familiar (especificar) _____ (3)- Con amigos _____
(4)- Otro (especificar) _____

Con algún familiar (especificar): _____

39.- ¿Le envían dinero (remesas) a usted? Si _____ No _____

Si la respuesta es “Si”, preguntar:

40.- Con que frecuencia es el envío _____

41.- Qué cantidad le envían _____

42.- Cual es el uso que le da al dinero recibido de las remesas

(1)-Pago de deudas _____ (2)-Comida _____ (3)-Medicina _____ (4)-Arreglos en la casa _____ (5)-Escuela _____ (6)-Tierra _____ (7)-Agricultura/animales _____ (8)-Gastos de la finca _____ (9)- Otro, especifique _____

43.- ¿Alguien del hogar tiene intenciones de salir de la comunidad? Si _____ No _____

Si la respuesta es “Si”,

44.- ¿Quién? _____

45.- ¿Cuál sería la razón para salir de la comunidad? (num opt)

(1)- Tierra _____ (2)-Fin de temporada en agricultura _____ (3)- Mejor empleo en el lugar de destino _____ (4)- Estudios _____ (5)- Familia _____ (6)--Otro (especificar) _____

46.- ¿A que lugar sería más probable que migraran?

A que Pueblo _____

De que Distrito _____

De que Cantón _____

Otro país (especificar) _____

47.- ¿Recomendaría a sus familiares o amigos venir a vivir a esta zona? Si ____ No ____

48.- ¿Por qué razón? _____

Migración nicaragüense

49.- ¿Cuál fue su último trabajo antes de migrar aquí?

| Año | Trabajo | Sueldo |
|-----|---------|--------|
| | | |

50.- ¿Cuál fue su primer trabajo en Costa Rica?

| Año | Lugar o zona | Trabajo especifique | Tiempo trabajando ahí | Sueldo |
|-----|--------------|---------------------|-----------------------|--------|
| | | | | |

51.- Actualmente, ¿Cuál es su estatus migratorio?

(1) Con residencia legal ____ (2) Sin residencia legal ____

(3) En proceso de residencia ____

Si la respuesta es con residencia legal,

52.- ¿Cómo hizo para obtener este estatus? _____

53.- ¿En qué año obtuvo su estatus migratorio de residencia? _____

54.- ¿Usted planea quedarse permanentemente establecido en este lugar?

Si ____ No ____

Si la respuesta es “No”,

55.- ¿Hacia dónde ira?

(1) Hacia Nicaragua ____ (2) Otra zona de Costa Rica ____

(3) Otro país, especifique _____

56.- ¿Por qué migraría de nuevo? _____

57.- ¿Qué necesitaría parar no tener que migrar?

(1) Crédito ____ (2) casa ____ (3) tierra ____ (4) trabajo fijo ____

(5) mejor sueldo ____ (6) mas seguridad ____ (7) Otro, especifique _____

58.- ¿Aun tiene familia en Nicaragua? Si ____ No ____ **Si la respuesta es “Si”**

59.- ¿Quiénes? (a)-Familiares cercanos ____ (b)-Familiares lejanos _____

60.- ¿Usted envía remesas a su familia en Nicaragua? Si ____ No ____

Si la respuesta es “Si”

61.- Con que frecuencia es el envío _____

62.- Qué cantidad le envían _____

63.- Le hubiera gustado quedarse en Nicaragua? Si ____ No ____

Si la respuesta es “Si”,

64.- ¿Qué hubiera necesitado para quedarse en Nicaragua? _____

Región _____ Cerca de cuál comunidad _____
 Número de la casa _____ Fecha _____

Tenencia, uso y propiedad de la tierra

1.- ¿Cuántas propiedades tiene? _____

2.-Cuadro 1- Tierra

| Numero de propiedad | ¿Cómo obtuvo esta tierra? (1)-Comprada a IDA (2)-Comprada a un particular (3)-Herencia (4)-Invasión (5)-Se alquila (6)-Solamente cuida | ¿Cuándo obtuvo esta tierra? (tiempo) | ¿Cuántas hectáreas? (extensión) | ¿Cuál es el uso principal de este tierra? (1)-Agricultura (2)-Pastoreo (3)-Conservación (4)-Turismo (5)-Residencial (6)-mixto(agri/past) (7)-otro | Cuál uso era cuando obtuvo esta tierra? | ¿Posee escritura de propiedad? (si/no) |
|---------------------|--|---|-------------------------------------|--|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |

Si la propiedad es de menos de una hectárea,

3.- En esta propiedad siembre productos para autoconsumo si _____ no _____

4.- Tiene animales en su propiedad Si _____ No _____

5.- Qué tipo de animales _____

En el caso de ser ganado,

6.- ¿Cuántos cabezas? _____

7.- ¿Ha vendido alguna de sus propiedades? Si _____ No _____

8.- ¿Cuándo? _____

9.- ¿Por qué motivo vendió su propiedad? _____

10.- ¿Tiene planes de expandir sus tierras en el futuro? Si _____ No _____

11.- ¿Para que utilizaría usted esa nueva tierra? _____

12.- ¿Qué necesitaría para hacer lograr dichos planes en esa nueva tierra? _____

14.- Cuando usted obtuvo la tierra, ya conocía sobre como manejar los cultivos de la zona?
Si _____ No _____

15.- ¿Tiene usted personas contratadas trabajando en su finca? Si _____ No _____

Si la respuesta es “Si”,

16.- ¿cuántas personas? _____

17.- ¿Cuánto les paga mensualmente? _____

18.- ¿Qué nacionalidad tienen? CR _____ NIC _____ Otro _____

19.- Si tiene ganado, El ganado que tiene usted la rota? Si _____ No _____

20.- ¿Con qué frecuencia lo rota? _____

21.-Cúantas cabezas de ganado tiene? _____

22.-Tiene arboles in su pasto? Si _____ No _____

23. ¿Cuáles son las razones principales para decidir que uso darle a la tierra (qué cultivo sembrar)? (1)-Bajos insumos _____ (2)-Altos precios del cultivo _____ (3)-Baja inversión _____ (4)-Poca mano de obra requerida _____ (5)-Simplicidad técnica _____ (6)-Experiencia en el cultivo _____ (7)-Tradicón familiar _____ (8) Facil colocación del producto _____ (9) Otro, especifique _____

24.- ¿Qué factores ecológicos son considerados para decidir donde y que se producira?

(1)-Calidad de suelos _____ (2) _____ Disponibilidad de agua (3) _____ Insectos/ enfermedades (4) _____ Pendientes (terreno) (5) Zona agro-ecológica _____

(6)Clima _____ (7)Limitaciones ambientales por

ley _____ (8)Otro, especifique _____

25.- ¿Qué es lo que usted cree que influya en los precios de estos productos?

(1)-el valor del dólar _____ (2)- comercio mundial _____ (3)- mercado nacional _____

(4)-Sobreproducción _____ (5)-factores ambientales _____ (6)- Políticas de importación _____

(7)- Control de calidad _____ (8)- Precios de subasta _____ (9)- Intermediarios _____

26.- ¿Qué insumos utiliza en sus cultivos?

27.- ¿Durante los últimos cinco años Ud. ha cortado charral para extender sus cultivos?

Si _____ No _____ **Si la respuesta es “si”,**

24.- ¿cuántas hectáreas _____

28.- ¿Participa en alguno cooperativa, cámara o asociación relacionada con producción agrícola? Si _____ No _____ **Si su respuesta es “si”,**

29.- Cuál(es)? _____

30.- ¿Ud. trabaja tierra que es o fue de su padre? Si _____ No _____

31.- ¿Alguno de sus hijos, trabaja tierra que es actualmente o fue de suya?

Si _____ No _____

32.- ¿A usted le gustaría que sus hijos siguieran siendo finqueros y heredaran su finca?

Si _____ No _____

33.- Cree que sus hijos quieren ser finqueros y heredad su finca? Si _____ No _____

Si la respuesta es “no”,

34.- ¿Qué pasaría con la finca cuando usted ya no pudiera trabajarla? _____

35.- ¿Realiza usted alguna práctica agroecológica?

Ex: cercos vivos, agroforestería, abonos orgánicos, producción orgánica, etc

36.- ¿Deja usted que las tierras se recuperen después de cultivarlas? Si _____ No _____

Si la respuesta es “sí”,

37.- ¿Por cuánto tiempo? _____

38.- ¿Con qué frecuencia? _____

39.- ¿Que cantidad de hectáreas? _____

40.- ¿Después de cuáles cultivos? _____

41.- ¿Cómo es la calidad de suelo?

(1)-Muy fértil ____ (2)-Igual que en otras partes ____ (3)-Pobre pero se puede trabajarla _____

(4)-No sirve para nada _____

42.- ¿Se ha visto afectada la producción agrícola pr algún cambio ambiental? _____

43.- Usted recibió crédito el año pasado para sus actividades agrícolas o para el ganaderas? Si _____ No _____

44.- ¿En el pasado, siente que hubo más ayuda agropecuaria? Si _____ No _____

Si la respuesta es “sí”,

45.- ¿Qué ha cambiado? _____

46.- ¿Cuenta con alguna certificación? Si _____ No _____

47.- ¿Cuales cultivos están certificados? _____

48.- Posee registro sanitario? Si _____ No _____ **Si la respuesta es “sí”,**

49.- Para cuales cultivos lleva registros _____

50.- ¿Usted cree que se ha vuelto más difícil vivir del campo? Si _____ No _____

51.- ¿Por qué? _____

52.- ¿Cuál es el futuro para los agricultores de esta región? _____

53.- ¿Si visualiza el futuro en negativo, qué es lo que usted hará? _____

54.- ¿Cuáles son los mayores desafíos que enfrentan como agricultores? _____

55.- ¿Qué cosas le gustaría ver diferente en el sector agrícola? _____

Región _____ Cerca de cual comunidad

Numero de la casa _____

Fecha _____

Preguntas Ambientales

1.- ¿Practica la cacería en esta zona? Si _____ No _____

Si su respuesta es “Sí”

2.- ¿Qué tan frecuentemente come carne de algún animal cazado?

3.- ¿Ha cambiado la cacería? Si _____ No _____

4.- ¿Cómo/por qué? _____

5.- ¿Practica la pesca en esta zona ? Si _____ No _____ **Si la respuesta es “Sí”,**

6.- ¿Qué tan frecuente come pescado, de la pesca que usted realiza? _____

7.- ¿Ha cambiado la pesca? Si _____ No _____

8.- ¿Cómo/por qué? _____

9.- ¿Qué cambios ambientales ha visto en la región en el tiempo que lleva viviendo aquí?

10.- ¿Hay zonas de Bosque cerca de esta zona? Si _____ No _____

11.- ¿Qué beneficios brinda el bosque?

(1)- da lluvia _____ (2)- protege el agua _____ (3)- protege el aire _____ (4)- productos medicinales o frutales _____ (5)- madera _____ (6) otro, especifique _____

12.- ¿Usted sabe si esta zona pertenece a algún Corredor Biológico? Si _____ No _____ 13.-

¿Cuál? _____

14.- ¿Usted recibe algún beneficio de sistema de conservación del bosque en esta zona?

Si _____ No _____

Si su respuesta es “Sí”,

15.- ¿Cuáles beneficios? _____

16.- ¿Conoce usted la Ley Forestal de Costa Rica? Si _____ No _____

Si la respuesta es “Si”,

17.- ¿Cuál es su opinión? _____

18.- ¿Cree que la reforestación en la zona genera algún beneficio a la comunidad?

Si _____ No _____

19.- ¿Cómo/por qué? _____

20.- ¿Usted recibe pagos por servicios ambientales? Si _____ No _____

Si la respuesta es “Si”,

21.- Que tipo? (1) conservación _____ (2) agro-forestal _____ (3) reforestación _____

22.-El contrato es por cuántos años? _____

23. En cual año esta usted _____

24. -Cuántos ha recibido actualmente _____

25.- Si es reforestación, cuántos ha invertido? _____

26. Va a renovar su contrato? Si _____ No _____

27. Porque? _____

Appendix D: Interview Guide For Producer Associations

La organización

1. ¿Para que empezó esta organización?
2. ¿Cuándo empezó?
3. ¿Que es el propósito de esta organización?
4. ¿Que servicios/beneficios da a sus afiliados?
5. ¿Personalmente, porque usted decidió afiliarse?
6. ¿Quiénes son sus afiliados en general (cuáles características tienen ellos)?
7. ¿Cuántos afiliados tiene?
8. ¿Ustedes tienen algunas actividades políticas?
9. ¿Tiene, como organización, algunos contactos estratégicos?

Reflexiones sobre el sector agrícola

10. ¿Cómo la agricultura en esta zona ha cambiado?
11. ¿Usted cree que se ha vuelto más difícil vivir del campo?
12. ¿Qué hay (Ej. políticas, asistencia) en el sector agrícola para apoyar pequeños y medianos finqueros?
13. ¿Qué hay (Ej. políticas, asistencia) en el sector agrícola para apoyar finqueros grandes?
14. ¿Cuál es el futuro para los agricultores (pequeños y medianos) de esta región?
15. ¿Si visualiza el futuro en negativo, qué es lo que usted hará?
16. ¿Cuáles son los mayores desafíos que enfrentan como agricultores?
17. ¿Qué cosas le gustaría ver diferentes en el sector agrícola?
18. ¿Qué mecanismos hay de iniciar cambios en el sector agrícola?

Appendix E: Interview Guide For Large Landholders And Agribusinesses

Historia

1. ¿Podría contarme un poco de la historia de esta finca?
2. ¿Cuándo comenzó operaciones en esta zona?
3. ¿Cómo adquirió esta tierra?
4. ¿Cuál uso era cuando obtuvo esta tierra?
5. Para que empezó este negocio/finca aquí en esta zona?
6. ¿Qué oportunidades vio usted aquí?
7. ¿Usted ha expandido sus tierras desde empezó este negocio/finca?
8. ¿Cómo adquirió esa tierra?

Producción

9. ¿Actualmente cuántas hectáreas tiene en total?
10. ¿Qué produce/cuales cultivos?
11. ¿Cuáles son las razones principales para decidir que uso darle a la tierra (qué cultivo sembrar)?
12. ¿Qué factores ecológicos son considerados para decidir donde y que se producira?
13. ¿Qué es lo que usted cree que influya en los precios de estos productos?
14. ¿Podría describir su proceso de producción? (desde de la semilla a la explotación hasta la venta)
15. ¿Cómo/Donde usted vende su producto?
16. ¿Qué es el producción por año?
17. ¿Cuáles son los ingresos anuales?
18. ¿Cuáles son los costos anuales de operación?
19. ¿Qué tan lejos está el mercado principal de este producto?
20. ¿Tiene la certificación internacional del comercio (es decir, Eurogap)?
21. ¿Posee registro sanitario? Para cuales cultivos lleva registros?

Si ellos tiene cultivos....

22. ¿Deja usted que las tierras se recuperen después de cultivarlas?
23. ¿Por cuánto tiempo?
24. ¿Con qué frecuencia?
25. ¿Que cantidad de hectáreas?

Si ellos tiene ganado....

26. El ganado que tiene usted la rota?
27. ¿Con qué frecuencia lo rota?
28. ¿Cómo es la calidad de suelo?
29. ¿Cuántas cabezas de ganado tiene?
30. ¿Tiene árboles en su pasto?

Ayuda, Insumos y empleados

31. ¿Usted recibe créditos fiscales o subsidios o asistencia técnica o alguno otra incentivo/ayuda del estado?
32. ¿Qué insumos utiliza? ¿Qué cantidad por año?
33. ¿Utiliza algún tipo de maquinaria?
34. ¿Ustedes están exento de pagar impuestos?
35. ¿Tiene agricultores que producen para usted a través de los contratos? ¿Podría describir cómo los contratos se funciona?
36. ¿Tiene empleados? ¿Cuántos empleados tiene?
37. ¿Cuales el puesto más alto? Y cuales es el salario?

38. Cuales el puesto mas bajo? Y cuales es el salario?
39. ¿Alguno de sus empleados son subcontratados? Cómo es?
40. ¿Qué nacionalidad tienen la mayoría de sus empleados?
41. ¿Qué servicios ofrecen a sus trabajadores? (Es decir, compensación para trabajadores, seguro de salud, vacaciones, etc.)

Cambios en extensión

42. ¿Ha cortado charal para extender sus cultivos en los últimos 5-10 años?
43. ¿Cuántas hectáreas ha tumbado?
44. ¿Ha vendido alguna de sus propiedades?
45. ¿Cuándo?
46. ¿Por qué motivo vendió su propiedad?
47. ¿Tiene planes de expandir sus tierras en el futuro?
48. ¿Para que utilizaría usted esa nueva tierra?
49. ¿Cuántas **hectáreas** quisiera tener?
50. ¿Qué necesitaría para hacer lograr dichos planes en esa nueva tierra?

Negocios

51. ¿Podría describir la estructura administrativa de este negocio? (Es decir, la cadena de comando)
52. Tiene una junta directiva?
53. ¿Quién está en su junta directiva?
54. ¿De qué país son?
55. ¿Qué cosas aquí facilitar sus negocios?
56. ¿Qué cosas son limitaciones?
57. ¿Existen restricciones ambientales o de zonificación que inhiben su producción uso de la tierra?
58. ¿Cómo ha cambiado este negocio---ha crecido con el tiempo?
59. ¿Cuáles son los mayores problemas que enfrenta en el logro de sus objetivos de negocio?
60. ¿Cómo ha cambiado esta región desde que comenzó este negocio?
61. ¿Tiene algún bosque en su terreno? ¿Cuántas hct? ¿Qué tipo?
62. ¿Qué políticas nacionales/políticas agrícolas son importantes para la producción, la transformación o la venta de su producto?
63. ¿Qué cosas le gustaría ver diferente en el sector agrícola?
64. ¿Se ha visto afectada la producción agrícola por algún cambio ambiental?

**Appendix F: Interview Guide For Rural Development And Agrarian Change Interviews
With Government Representatives**

Developed by Renée Hill and Irene Shaver

Introducción.

- Somos estudiantes en el CATIE y estamos **desarrollando un trabajo de investigación** sobre el desarrollo rural en esta zona.
- **Como parte de este proyecto** estamos entrevistando a representantes de las agencias y organizaciones que trabajan en temas de desarrollo rural y comunitario. Estamos tratando de **conocer las experiencias de estas organizaciones y las comunidades en esta zona y aprender sobre el contexto local.**
- **Le agradecemos mucho** por tomar su tiempo para conversar con nosotras y por apoyar nuestros esfuerzos para desarrollar nuestras investigaciones.
- Antes de empezar, quería saber si **nos permite grabar la conversación.** El único propósito de esto es de poder escuchar la grabación después para mejorar nuestros apuntes y asegurarnos que entendemos bien lo que usted nos cuenta. Después de esto lo borraré y nada de lo que usted dice estará vinculado con su nombre, y su identidad mantendrá desconocido por los demás. Nos permite hacer la grabación? (Si en cualquier momento de la conversación usted quiere apagar el aparato por cualquier razón, nos puede avisar.)
- Tienes un **límite de tiempo** para nuestra conversación hoy día? Pensamos que debería tomar más o menos una hora.

Preguntas para representantes de agencias nacionales y organizaciones que trabajan en temas de desarrollo rural y/o comunitario

| |
|---|
| <p>1. La historia de tu organización...</p> <p>1A. Cuándo empezó?</p> <p>1B. Cómo empezó? Por qué? Para responder a cuales necesidades?</p> <p>1C. Cómo ha cambiado a través del tiempo? Sigue cumpliendo el mismo rol o respondiendo a las necesidades?</p> <p>1D. La misión de la organización? Las metas principales? Cómo ha cambiado con el tiempo?</p> |
| <p>2. Cuáles son las actividades principales de la organización en cuanto al desarrollo rural o comunitario?</p> <p>2A. Que hacen en las comunidades?</p> <p>2B. Cuáles son los éxitos principales? Por que es un éxito? Detalles?</p> <p>2C. Cuáles son los retos principales? Por que es un reto? Detalles? (Ej. Financiamiento, etc.)</p> <p>2D. Cuáles son las restricciones o limitaciones principales que enfrentan?</p> <p>2E. Cómo se superan estos retos? Cuales estrategias usan para superarlos?</p> |
| <p>3. Cuáles son las necesidades o problemas principales de las comunidades que sirven (en esta zona)?</p> <p>3A. Las actividades en que están involucrados responden a estos problemas?</p> <p>3B. Hay otras cosas que les gustaría poder hacer para mejor ayudar a las comunidades?</p> <p>3C. Que se necesita hacer para poder mejor responder a las necesidades de las comunidades?</p> <p>3D. Hay diferencias entre las comunidades? Detalles?</p> <p>3E. <i>Como Ud. define “desarrollo rural”? o “desarrollo comunal”?</i></p> |
| <p>4. Hay otras instituciones que trabajan en el tema de desarrollo rural?</p> <p>4A. Hay instituciones que responden a las necesidades que mencionó arriba?</p> <p>4B. Proveen de las mismas servicios? O son distintos?</p> <p>4C. Hay vínculos entre las organizaciones? Trabajan en conjunto o hay tensiones entre ellas?</p> <p>4D. Hay coordinación inter-institucional? Se necesita? Funciona bien o no? Por qué sí o no?</p> |
| <p>5. Cuáles son las metas nacionales para el desarrollo nacional?</p> <p>5A. Están alineado con las metas de su organización?</p> <p>5B. Están alineado con las metas de las comunidades que sirven/en esta zona?</p> <p>5C. Estas metas están en camino a ser logrado? Por qué sí o no? Factores para lograr o no?</p> <p>5D. Que cree que diría la gente de las comunidades?: Que las metas se logran o no? Que dirían que se hace bien o que hace falta?</p> <p>5E. Que le gustaría ver distinto en el futuro? Cuáles cambios serían ideal en su opinión? Por qué?</p> |
| <p>Preguntas específicas para IDA:</p> <p>A. Puede explicar el proceso de adquisición de las tierras para IDA en el pasado? Era tierra de buena calidad, tierra de bajo precio? Cuáles tipos de tierras adquirieron?</p> <p>B. Puede explicar el proceso de lograr que la tierra esté inscrito en nombre del dueño/propietario?</p> <p>C. Hay mucha tierra sin título? Por qué? Cuáles barreras existen? Cuáles implicaciones tiene</p> |

para el bienestar de la gente o las comunidades?

D.Cuál es la meta a largo plazo para el desarrollo agrario? Promover que se queden en la tierra o que se migran a los centros urbanos? Promover fincas chicas o de subsistencia? Promover producción de alimentos para el país o darles capacidad para competir en el mercado global?

E. Las políticas de uso de tierras, por ejemplo la forma de cortar los arboles o el bosque, han impactado a la conservación o la biodiversidad?

F. Hacen algo en cuanto al precarismo (la toma de tierras)?

G. IDA tiene imágenes de todas las fincas o parcelas de un asentamiento, en un solo imagen, no por separado?

Preguntas específicas para DINADECO:

A. Cómo se define rural? Por las instituciones? Censo? Conversando? Etc...

B. Existen indicadores de desarrollo, como el desarrollo comunal es una meta de DINADECO? Cuáles sería indicadores de desarrollo?

C. Cuáles factores facilitan o inhiben el desarrollo rural o comunal?

D. Información de contacto para gente de DINADECO en Puerto Viejo?

E. Hay diferencias entre comunidades (en cuanto a su organización, retos, nivel de desarrollo) en esta región cerca a Turrialba? Hay diferencias entre regiones? Por qué?

F. DINADECO trabaja o se coordina con IMAS?

G. Información de contacto para IMAS en Turrialba?

H. Vamos a facilitar unos talleres en las dos regiones. Vamos a invitar a los líderes de las comunidades y facilitar que conversan sobre el pasado, eventos principales, retos y éxitos principales, y lo que imaginan para el futuro. Y conversar sobre estrategias para lograr las metas.

Estamos desarrollando las ideas ahora, y cualquier tipo de sugerencias o ideas que quiere compartir sería muy útiles.

- Los líderes de las Asociaciones son las correctas, o estaríamos dejando afuera algunos importantes?

- El punto es entender las experiencias de las comunidades con el desarrollo rural y permitir un espacio para compartir sobre estos temas. Esto siendo las metas, que cree Ud. Que deberíamos preguntarles o cuáles actividades serían adecuados para el taller?

Preguntas específicas para MAG:

A. Políticas de agricultura: hay énfasis en exportaciones? De donde viene este énfasis? Viene del Estado? Cuáles son los incentivos aquí de sembrar para exportación, por ejemplo piña?

B. Cómo ha facilitado el Estado la producción en esta región?

C. Cuán importante es para el desarrollo económico (PIB) de Costa Rica? Y en este contexto, cuál es el rol del pequeño y mediano finquero?

Preguntas específicas para IMAS:

A. Cómo es su sistema de monitoreo? Hay seguimiento después de que IMAS da asistencia?

B. Hay requisitos para recibir los servicios sociales del IMAS?

C. Cuáles características tiene la gente mas servidas por IMAS? (ocupación, etc.)

D. Según su punto de vista, porqué la gente necesita ayuda de IMAS? Cuáles son los factores que contribuyen a la pobreza y las necesidades en este país, y esta región?

Cerrando la entrevista.

- Ud. tiene algún **comentario o pregunta adicional** para mi?
- Hay algo sobre estos temas que Ud. encuentra que **debería haberle preguntado para mejor entender el tema del desarrollo rural?**
- **SNOWBALL:** Hay **alguien mas** con quien Ud. recomendaría que yo hablara sobre estos temas? [Buscar: **diferentes grupos de actores** y potencialmente quien tendría **perspectivas diferentes** sobre temas relevantes]
- [**Preguntar solo cuando grabo con audio:** Me gustaría saber si le podría mandar una copia de mis apuntes sobre nuestra conversación para que lo vea y haga cualquier corrección o cambio que desea. Esto sería para asegurarme que haya entendido nuestra conversación.]
- **Le agradecemos muchísimo** por tomar su tiempo hoy día para conversar con nosotras y por apoyar nuestros esfuerzos de investigación en estos temas. **Le deseamos mucho éxito** en sus proyectos y esfuerzos también. **Estaremos en contacto** en el futuro. Muchas gracias de nuevo.

Apuntes y reflexiones post-entrevista.

- Aprendí algo Nuevo de esta entrevista?
- Hoy día, como veo la gran historia (big picture)?
- Cuales otras preguntas debería estar hacienda y a quien?
- Hay preguntas que no funcionan bien o que son incomodas? Debería revisar o cambiar algunas?
- Cuales son mis reflexiones sobre como esto cabe dentro de mis ideas para investigación disciplinaria e interdisciplinaria?
- Hay algo en particular sobre esto que yo debería comunicar a mi equipo?
- Hay algo en particular sobre esto que yo debería comunicar a JD or LT?
- Seguir agregando a esta lista para mejorar mis apuntes de entrevistas y terreno.

Appendix G: Facilitators Guide For Community Workshops

Developed by Renée Hill and Irene Shaver

Introducción (30 minutos)

Coffee and pansitos

Bienvenidos- **Gracias** a los **que nos apoyaron** en organizar este taller, y a todos los **participantes** por tomar su tiempo para estar aquí hoy. Estamos muy **entusiasmadas** estar aquí y poder compartir esta experiencia con ustedes. Antes de que empecemos con las actividades, queremos **presentarnos** todos para que nos vayamos conociendo.

Presentaciones de facilitadores y participantes

- **Renée:** Soy Renée (y yo soy Irene). Somos estudiantes del doctorado en CATIE, en el programa conjunto con la Universidad de Idaho en EE. UU. Estamos participando en proyectos de investigación en esta zona de Turrialba y Jiménez, y además en Huetar Norte (Sarapiquí y San Carlos). Un proyecto en que las dos estamos colaborando esta enfocado en el desarrollo comunal y rural. Como parte de este proyecto estamos haciendo talleres con unas comunidades para compartir experiencias y intercambiar ideas sobre el desarrollar comunal. Por eso estamos aquí hoy día. El año pasado conocí a Don Luis y la semana pasada conocimos las dos a Don Alexander, quién nos apoyo en organizar este taller.
- **Gracias por darnos permiso para filmar** el taller- El propósito de esto es de poder capturar la experiencia y escribir un mejor resumen de lo que pasa hoy día, lo cual les vamos a entregar a ustedes después del taller.
- **Irene:** Antes de empezamos, tengo un confesión...Solamente tengo 5 meses de hablar español y todavía estoy aprendiendo. Por eso a veces yo cometo errores pero entiendo la mayoría de lo que dicen especialmente si hablan despacio y claro. A pesar de que he estudiado este tema mucho y soy de un pueblo pequeño en estados unidos que ha tenido que hacer transiciones difícil de desarrollar y por eso este tema es cerca de mi corazón. Estoy emocionada de participar en este taller con ustedes. Y muchas gracias por su paciencia con mi español y de nuevo por su participación en este taller. Bueno, para empezar queremos conocerles. Podrían venir uno por uno de escribir en la muralla su nombre, cuanto tiempo ha vivido en la comunidad, la organización que representa, otras organizaciones en que ha participado y porque estas aquí.
- **[TENER ESCRITO EN LA MURALLA] Participantes-** Nombre, cuanto tiempo ha vivido en la comunidad, organización que representa, otras organizaciones en que ha participado, porque estas aquí hoy

Dinámica

- **Sillas contestadas**
 - Formar 3 grupos (no mas de 7 personas por grupo)
 - Dar papeles a cada grupo
 - Diles que no compartan las instrucciones con otros grupos
 - Pon timer de reloj para 8 minutos
 - Cómo fue la experiencias? Qué fue difícil y por qué? Qué relación tienen estas dificultades con el trabajo en grupos comunales? Hubo conflicto o frustraciones? Hubo cooperación o soluciones creativas?

- *Punto principal*- muchas veces tenemos metas o perspectivas diferentes y sin comunicarnos y trabajar juntos es muy difícil lograr las metas individuales o lograr que haya una meta grupal.
- **Normas básicas compartidas [TENER ESCRITAS EN LA MURALLA]**
 - Escuchar bien a los demás
 - Respetarse a si mismo y a los demás
 - Estar de acuerdo de no estar de acuerdo- diversidad es riqueza
 - Ser abierto a compartir y aprender
 - Alguien quiere quitar, cambiar o agregar una norma compartida?
- Este taller es para ustedes, esperemos que aprovechen y disfruten

Agenda y actividades

- **Breve explicación:** Historia compartida, visión para el futuro, como se puede lograr esto como comunidad
- **Nuestro propósito y metas-** Crear espacio para que ustedes reflexionen juntos como miembros activos de esta comunidad, y espacio cómodo para tener esta conversación. Nosotras no estamos aquí para dar respuestas ni resolver ningún problema específico. Sino que nuestra meta con este taller es apoyar a ustedes dándoles esta oportunidad para visualizar las metas y retos de esta comunidad en una forma holística que incorpora varias perspectivas distintas. Y con esta experiencia pueden desarrollar prioridades y compartidos. Esperamos que esta experiencia sea útil para ustedes y a la vez nuestra orientación como estudiantes sea un apoyo para sus esfuerzos.

Historia compartida (2 horas)

Pregunta principal- Cuales son los eventos y principales que han formado e influenciado la comunidad de Pejibaye?

- Principales puntos o períodos de cambios
 - Éxitos principales; Retos principales
 - Eventos y fuerzas externos y internos a la comunidad (ej. Coop quebró aquí, pero el precio de café cayo a nivel internacional)
 - Ejemplos/categorías: Fuentes de empleo; Cambios principales en la orientación económico; infraestructura; Asociaciones de Desarrollo; Proyectos principales;

Propósito- El **propósito principal** de esta actividad es de establecer en forma visual el contexto que describe cómo esta comunidad ha llegado a lo que es hoy día. La idea es **documentar sus logros** y a la vez **reconocer sus retos**. Este tipo de actividad puede **estimular reflexiones** sobre estrategias y capacidades para enfrentar y superar estos retos e **ir encaminándose hacia las metas para el futuro**. Además esta actividad puede proveer de una línea base desde lo cual los miembros de esta comunidad, como ustedes, pueden **trabajar en conjunto** para lograr sus metas.

Escribir y dibujar la historia (usar palabras, dibujos, símbolos, ...) (30 minutos)

- Diles que el lado derecho es el presente, y el lado izquierdo es un punto en el pasado (por ejemplo, puede ser cuando se formo la comunidad)
- **PROBES** durante la actividad

- *Cuales eventos ocurrieron antes para influir este evento (eventos y fuerzas externos e internos)*
- *Y que pasó después de esto? Cuales fueron las consecuencias de esto?*
- *Irene y Renée ponen sus mismos al lado derecho del papel, para mostrar que están allí compartiendo con ellos?*

Conversación con grupo entero (1 hora)

- Presentar lo que se dibujo y por qué (30 minutos)

PROBES:

- Por qué dibujó esto? O por qué lo dibujó/escribió así?
- Cómo cambió la comunidad con esto? Positivo? Negativo? Detalles
- Identificar dos principales éxitos/logros (con **stickers**)
- Identificar dos principales retos (con **stickers**)
- *PROBES* durante la conversación:
 - **Ej. Específicos de fuerzas:** Cuáles son los factores que les ha permitido adaptar en el tiempo o superar los problemas o retos? [Cuales son las estrategias que han utilizado para superar retos? Como lo han podido lograr?]
 - **Q. GENERAL/RESUMEN:** Mirando esta historia y con esta conversación, Cuáles han sido fuentes de fuerza consistentes en esta comunidad? (personas, instituciones, procesos de organización y trabajo, recursos, etc.)
 - Cuáles han sido fuentes de frustración o barreras consistentes en esta comunidad? (personas, instituciones, procesos de organización y trabajo, recursos, etc.)
 - [*Interés de IreneE:* Hay instituciones publicas que han tenido un rol en estos eventos, actividades y esfuerzos?Cuál ha sido su rol? Ha sido beneficioso o inhibidor? Por qué?]
 - [*Interés de IreneE:* Que ha sido el rol de las asociaciones de desarrollo y comités en estos procesos? (en responder a necesidades; en contribuir a problemas; en identificación de los problemas?)]
 - [*Interés de Renée:* Agua y gobernanza: (*Renée poner atención a estas cosas*) **Q.** AP, WW y SR se identifican explícitamente como éxitos o retos principales? **Q.** Cuan relevante han sido AP, WW y SR en comparación con otros temas? **Q.** Quien ha sido (si o no) involucrado con o preocupado por temas de AP, WW y SR?]

Resumen (2 minutos)

- **ALGO POSITIVO** *Quizás decir:* Esto muestra cuanto han adaptado a los cambios a través del tiempo, y como han superado ciertos retos. Esto es evidencia que problemas, conflictos y diferencias en valores y perspectivas eventualmente han llevado a acciones y cambios positivos.
- Transición- después del almuerzo vamos a hacer algo parecido pero sobre las visiones para el futuro

Almuerzo y café (12:30-1:00)

Visión del Futuro (2 horas)

Pregunta principal- **Como les gustaría ver a su comunidad en 5, 10 o 20 años? Como se imaginan que se podría ver esta comunidad en el futuro? Cuales visiones a futuro tiene para su comunidad?**

- Ejemplos: Metas y visiones para esta comunidad; Reflexionando en la conversación sobre la historia compartida; En términos económicos (ej. Empleo); en términos sociales; infraestructura; organización social; participación comunitaria.

Propósito

- El **propósito principal** de esta actividad es de establecer en forma visual el contexto que describe como esta comunidad le gustaría ser en el futuro, cuales cambios les gustaría hacer, y cuales metas les gustaría establecer para ir trabajando hacia estos. La idea es **documentar sus visiones y reflexionar sobre las cosas que quieren y pueden lograr para decidir como lo van a hacer como comunidad**. Este tipo de actividad puede **estimular reflexiones** sobre **estrategias y capacidades** para enfrentar y superar los retos que han identificado en el pasado y que actualmente tienen y ir encaminándose hacia las metas para el futuro. Además esta actividad puede proveer de una línea base desde lo cual los miembros de esta comunidad, como ustedes, puede trabajar en conjunto para lograr sus metas. Y además es **un esfuerzo de reunir los miembros activos de las distintas organizaciones comunales actuales** para poder **compartir sus visiones** y ver como pueden **apoyarse mas y trabajar mas en conjunto** para lograr las **metas compartidas**.

Escribir y dibujar la visión del futuro

- Diles que el lado izquierdo es el presente, y el lado derecho es un punto en el futuro (por ejemplo, 10, 20 o más años en el futuro)
- **PROBES** durante la actividad

Conversación con grupo entero

- Presentar lo que se dibujo y por qué (dejar que la conversación se vaya con el viento)
- Identificar dos principales prioridades a corto plazo (1-5 años) (con **stickers**)
- Identificar dos principales prioridades a mas largo plazo (5-20 años) (con **stickers**)
 - **PROBES** para la conversación sobre las dos prioridades identificadas arriba:
 - Que necesitarán para lograr esto? Que ya tienen (recursos financieras, sociales, etc.) y que más se necesita?
 - Cuáles retos se enfrentarían en tratar de lograr esto?
 - Quién se necesita involucrar en estos esfuerzos? Cómo se logra que se involucren?
 - Cómo pueden apoyarse como organizaciones comunales trabajando juntos para lograr estas metas?

Resumen (5 minutos)

- Reflexiones sobre la actividad y esta conversación
- **Qué aprendieron de esta actividad?**

Evaluación (20 minutos)

- **Es muy importante para nosotros saber como fue esta experiencia para ustedes porque vamos a facilitar estos talleres en varias comunidades. Y sus comentarios y sugerencias pueden ser muy útiles para nosotras.** Les vamos a dar esta oportunidad de escribir en forma **anónima** una evaluación y luego una conversación.
- Evaluación **escrita individual** (10 minutos)
- Evaluación **oral en grupo** (10 minutos)
 - Cómo fue la experiencia del taller?
 - Cuales les gusto?
 - Cuales cosas no les gusto o podrían haber sido mejor?
- **Que aprendiste del taller que puedes llevar a tus asociaciones o grupos comunales? Que les puede ser útil para sus trabajos comunales?**
 - **ESCRIBIR EN PAPEL EN MURALLA**

Cerrando el taller (5 minutos)

Pueden continuar con este tipo de planificación y discusión en sus grupos, cuando quieren y como quieren. Esperamos que tomen estas actividades como un ejemplo de un proceso que pueden utilizar en tus organizaciones y grupos. Esperamos que ven que es **valioso mirar hacia el pasado** para darse cuenta que hay mucha gente involucrada que donan su tiempo y esfuerzos para la comunidad, y que han logrado mucho hasta este momento. Además que tienen recursos disponibles que han utilizado para lograr muchas cosas. Pero **que esta mirada hacia atrás ayuda a visionar para el futuro** e ir encaminándose hacia lograr las metas bonitas que tengan como comunidad.

- **Herramientas** que les tenemos en la carpeta
- Y lo que **les vamos a entregar** dentro de las próximas semanas
 - Documento- Resumen del taller, con un poco de nuestro análisis
 - Los dibujos de la historia y el futuro
 - Herramientas para trabajos en grupo- ej. Evaluación y planificación
- Y cualquier cosa o duda que tengan, **nos pueden contactar** a estas direcciones electrónicos.

Les agradecemos muchísimo por estar aquí hoy día y tomar su tiempo para involucrarse en esta actividad. Esperamos que fue un buena experiencia para ustedes y que les será de utilidad. Les felicitamos por haber logrado tanto en su comunidad y les deseamos mucha suerte y fuerza mientras van avanzando hacia lograr sus metas para el futuro.

Appendix H: Invitation For Community Workshop

Estimado/a Señor o Señora,
Como miembro activo de su comunidad quien ha dedicado valuable tiempo e importantes esfuerzos al desarrollo y bienestar de Pejibaye mediante su participación en

le invitamos cordialmente a participar en un taller para compartir sus experiencias y analizar las oportunidades y los retos en el desarrollo comunal de Pejibaye. En este evento se pretende contar con su participación junto a otros miembros de las asociaciones comunales actuales.

Apreciaríamos contar con su presencia en este taller

el sábado 17 de marzo del 2012

desde 10am hasta 4pm

en el antiguo Cruz Roja.

Se proveerá de café y almuerzo para los participantes.

Los organizadores de este evento somos dos estudiantes del Programa Conjunto entre La Universidad de Idaho, EE.UU. y CATIE. Ellas se están realizando los estudios doctorales en el tema de desarrollo rural y comunal en varias comunidades en la Región Central-Occidental y la Región Huetar Norte de costa Rica.

De antemano agradecemos su participación en este taller y su dedicación hacia el beneficio de su comunidad.



Appendix I: IRB Approval and Extension Letters

University of Idaho

Office of Research Assurances Institutional Review Board

PO Box 443010
Moscow ID 83844-3010

Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Hormel, Leontina
Cc: Shaver, Irene

From: Traci Craig, PhD
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010

IRB No.: IRB00000843

FWA: FWA00005639


Date: November 9, 2011

Title: 'Rural livelihoods, Land Use and Transnational Migration in the
Borderland, Costa Rica '

Project: 11-078
Approved: 11/09/11
Expires: 11/08/12

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the above-named research project is approved as offering no significant risk to human subjects.

This approval is valid for one year from the date of this memo. Should there be significant changes in the protocol for this project, it will be necessary for you to resubmit the protocol for review by the Committee.



Traci Craig

University of Idaho

October 9, 2012

Office of Research Assurances

Institutional Review Board

PO Box 443010
Moscow ID 83844-3010

Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Hormel, Leontina

Cc: Shaver, Irene

From: Traci Craig, PhD
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010

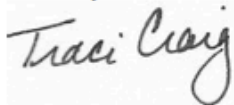
Title: 'Rural livelihoods, Land Use and Transnational Migration in the
Borderland, Costa Rica '

Project: 11-078
Approved: 11/09/12
Expires: 11/08/13

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the **first-year extension** of your proposal is approved as offering no significant risk to human subjects as no changes in protocol have been made on this project.

This extension of approval is valid until the date stated above at which time a second extension will need to be requested if you are still working on this project. If not, please advise the IRB committee when the project is completed.

Thank you for submitting your extension request.



Traci Craig

University of Idaho

September 9, 2013

Office of Research Assurances

Institutional Review Board

875 Perimeter Drive, MS 3010

Moscow ID 83844-3010

Phone: 208-885-6162

Fax: 208-885-5752

irb@uidaho.edu

To: Hormel, Leontina

Cc: Shaver, Irene

From: Traci Craig
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010

Title: 'Rural livelihoods, Land Use and Transnational Migration in the
Borderland, Costa Rica '

Project: 11-078
Approved: 11/09/13
Expires: 11/08/14

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the **second-year extension** of your proposal is approved as offering no significant risk to human subjects as no changes in protocol have been made on this project.

This is a second year extension of approval and is valid until the date listed above at which time a new protocol will need to be requested if you are still working on this project. If not, please advise the IRB committee when you are completed. Should there be any significant changes in your proposal within the year, it will be necessary for you to resubmit it for review.

Thank you for submitting your extension request.



Traci Craig