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Potential Links Between Certified Organic Coffee and Deforestation in a Protected Area in Chiapas, Mexico

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Summary. — This study considers organic coffee certification and deforestation in the El Triunfo Biosphere Reserve of Chiapas, Mexico. Land reform, dating back to the revolution, has created a complex context for measuring land use change. The locally improved price of organic production, maintained yield, and plantation growth rate—twice that of conventional producers—raise questions about potential deforestation. While consumers believe organic does not deforest, no measurements are taken during inspection. As communal land privatizes without an established baseline for land use change, improved organic certification inspections are needed to verify good practices and advance forest conservation in the coffee sector.

Key words — land use change, organic coffee certification, *Ejidos*, deforestation, Mexico, biosphere reserve

1. INTRODUCTION

(a) Land use change and coffee

Land use change and deforestation is the third largest contributor to global climate change, accounting for 17% of total greenhouse gas emissions (IPCC, 2007). In the tropics, during 1980–2000, 55% of new agricultural land in the tropical world came from intact forests and another 28% from disturbed forests (Bosselmann, 2012; Gibbs *et al.*, 2010). Further, agriculture is considered the principal cause of deforestation in the tropics (Kuusela & Amacher, 2015) and this land use is expected to increase another 18% by 2050 (MEA, 2005). While there are many cultivars in the tropics, coffee is unique. Coffee is an understory plant and its traditional cultivation requires a tree canopy for shade, which inevitably places it in forested landscapes. Improving the management of agricultural practices globally and their relationship with forests is critical for the mitigation of greenhouse gas emissions that lead to climate change. The distribution of coffee in over 85 countries with 20–25 million producers in almost exclusively forested landscapes then makes its management crucial for protecting forest at the global scale (Calo & Wise, 2005; Rice, 2001).

Mexico is one of the largest coffee producers in the world, cultivating approximately 800,000 ha (FiBL & IFOAM, 2013). In the state of Chiapas, plantations occupy roughly 250,000 ha (Conservation International, 2011). Land use change accounts for the majority (59%) of CO_2 emissions in Chiapas. Moreover, between the years 1975 and 2000, Chiapas lost 109,087 ha, or about 50% of its native forest, in the highlands, demonstrating that this Mexican state also faces the challenge of managing the interaction between agriculture and forests (Cayuela, Benayas, & Echeverría, 2006). The Biosphere Reserve El Triunfo (REBITRI) of Chiapas, where the study site is located, experienced significant deforestation between the years 1975 and 2000. Eighty one percent, or 12,298 ha, of the deforestation in that period occurred following the collapse of the International Coffee Agreement (ICA) in 1989 and the Instituto Mexicano de Café (INMECAFE) in 1992 (Cortina-Villar *et al.*, 2012). This highlights coffee production as a significant part of the agriculture and deforestation conversation in Mexico. Certifying the organic production of coffee began in 1990 to mitigate some of the effects caused by this collapse and also sought to promote environmentally sustainable practices that often parallel traditional cultivation.

Organic coffee is grown in 26 countries worldwide; spanning more than 600,000 ha, it accounts for 6% of the world's harvested coffee area, as of the year 2011 (FiBL & IFOAM, 2013). Additionally, all organic coffee certification prohibits deforestation. Therefore, coffee consumers purchasing the organic seal often believe that their purchase is fostering protection of natural environments (Aragón-Gutiérrez, Montero-Simó, Araque-Padilla, & Gutiérrez-Gutiérrez, 2013). Verifying this requirement is difficult, however—as it involves complex land-use-change science. Land-change science is a critical part of sustainability science and measuring global environmental change. The science works to understand the human and environmental dynamics that precipitate changing land uses and covers by addressing type, magnitude, and location of impacts (Rindfuss, Walsh, Turner, Fox, & Mishra, 2004). Land use records or surveys can serve as a baseline in some studies, while others rely on interpretation of aerial or satellite imagery, using computer modeling to

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develop statistics of change over time (Geist & Lambin, 2002). Land use studies are necessary to address forest conservation and greenhouse gas mitigation.

This investigation explores certification at the local scale in Chiapas in order to better understand land use change and the relationship between agriculture and forests in Mexico. The goal is to open a dialog about how organic certification can serve as a control mechanism for deforestation globally. To start, we ask what are the economic and environmental benefits of organic coffee certification? And followed that with the question, how do the differences between conventional and organic production in price, yield, and practice factor into the land use conversation? Further, we ask how land use change is measured and by who. In order to work toward mitigating climate change in the Mexican coffee sector, it is imperative to start with coffee's history and its relationship with land use change over the course of Mexican land reform.

(b) The history of organic certification and cooperatives in Mexico

The global coffee market was regulated until 1989 by the ICA, which was created in 1940 to establish market share allocation for producer countries. Bray, Sanchez, and Murphy (2002) recounts that INMECAFE was created to provide market control in Mexico, specifically, and purchased up to 47% of the national coffee output in some years to control price. INMECAFE encouraged many agricultural producers to enter the coffee market. Although INMECAFE was frequently challenged by corruption, they did provide trainings and subsidies in an effort to support these new coffee producers and ensure their success in the market (Bray *et al.*, 2002). The system put in place by the ICA and INMECAFE saw its greatest success in the 1980s, maintaining a stable global coffee price between US$1.20 and US$1.40/lb (Calo & Wise, 2005).

In 1989, the ICA collapsed over regulatory disputes and loss of support from participating countries (Petchers & Harris, 2008). Since then, the global price for coffee has remained around a 100-year low (Murray, Raynolds, & Taylor, 2006). The liberalization of the market has drastically increased volatility with repeatedly depressed prices as low as US $0.50/lb. An average producer's market share has dropped from 30% in the 1980s to around 10% since 2000 (Calo & Wise, 2005). In Mexico, with INMECAFE dissolved, trainings and subsidies have been reduced and coffee producer support has been decentralized to several institutions of coffee-producing states, making large-scale expensive land use change studies more difficult. Bacon (2005) found that the severe reduction in support after the loss of subsidy-granting government institutions and low prices created a poverty trap for coffee farmers, with fewer resources for the maintenance of coffee plantations and subsequently for families. This perpetually creates lower returns and worsening conditions the following year. Coffee production becomes increasingly difficult with poorly-maintained fields and processing equipment, and is exacerbated by the resulting challenges placed on families with fewer resources (Bacon, 2005).

The coffee certification movement presents a market-based solution for the issues created by the liberalization of trade by setting minimum prices and offering price premiums to reduce volatility, improving market share, and incentivising ecologically sustainable production (Potts, 2007). Organic coffee certification is designed to prevent environmentally harmful practices. It prohibits agrochemical use and deforestation, requires erosion control measures, and specifies buffer zones between producer's parcels and bodies of water (Blackman & Naranjo, 2012; Philpott & Bichier, 2012). Further, the market for certified organic coffee is doubling every five to six years (Calo & Wise, 2005). As of 2011, 185,000 ha, or 25% of Mexico's harvested coffee area, was certified organic (FiBL & IFOAM, 2013). Organic production is therefore central to addressing the challenges brought on by land use change in the coffee sector of Mexico.

Three and a half million people in Mexico depend on coffee as their primary source of income. Of these coffee producers eighty-six percent hold fewer than 10 ha and 27% fewer than 1 ha (Calo & Wise, 2005). Due to lack of individual capacity, these small-scale producers depend on cooperatives for achieving organic certification (Gómez Tovar, Martin, Gómez Cruz, & Mutersbaugh, 2005; Raynolds, 2004). Cooperatives have evolved in recent years, diversifying their business models, which began simply as uniting producers to jointly sell their coffee for improved negotiation of price. Market, service, and agricultural cooperatives focus on business themes including marketing, production, financing, and administration. Cooperatives can also store coffee to wait for improved prices, and maintain longer-term relationships with roasters to control quality. A cooperative business model common in the coffee sector is organic product upgrading, which transitions an individual plantation from conventional practices to organic by way of inspection and certification of required practices. The coffee certification literature does not address the benefits of cooperatives specifically, more consistently focusing on the certifications and the benefits of their application in many areas of Latin America (Beuchelt & Zeller, 2013).

The benefits of organic certification have been varied. Some research shows that it can require as much as three times more work, can result in significantly diminished yield (Van Der Vossen, 2005), offers little price premium during favorable market conditions (Potts, 2007), and that the premiums it does offer are likely to decrease as niche markets continue to grow (Kilian, Jones, Pratt, & Villalobos, 2006). Other research shows that yield can quickly return to pre-transition levels (Potts, 2007), or that traditional shade systems input is very similar to organic production (Blackman & Naranjo, 2012) and transition costs are low (Heidkamp, Hanink, & Cromley, 2008), and that in combination with other certifications, such as Fairtrade, which offers an additional price premium, real economic benefit can be seen for small-scale producers (Calo & Wise, 2005). Fairtrade, which seeks fair compensation and market share for producers, is not discussed in this paper as the requirements of organic certification are more crucial to the land use change dialogue.

In terms of environmental impact, research demonstrates many benefits from the practices required of organic production. Buffer zones reduce contamination of bodies of water and can improve water quality (Blackman & Naranjo, 2012; Bray *et al.*, 2002). Plantations with organic practices can have up to 40% more topsoil (Holt-Giménez, 2002). Organic production also prohibits agrochemicals because they can contaminate water, can stress topsoil by causing increased erosion from damaging biotic systems, and they can also create health risks for producers (Amekawa, Sseguya, Onzere, & Carranza, 2010; Castro-Tanzi, Dietsch, Urena, Vindas, & Chandler, 2012). To date, there exists a dearth of research examining the relationship between organic coffee certification and deforestation, despite its prevention being a requirement of the certification. This investigation provides insights into this relationship.