Coffee, Conservation, and Livelihood Strategies: A Case Study from Northern Nicaragua

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Certain shade coffee production systems support high levels of biodiversity often comparable to natural forests. Drastic changes in the coffee industry, however, threaten small-scale producers that are thought to utilize such systems. Using the Miraflor area in northern Nicaragua as a case study to examine both the human and ecological landscape, this research assesses the shade systems used by small-scale producers and explores the livelihood strategies that allow them to continue utilizing these systems. Results from the categorization of different shade production systems and interviews with growers demonstrate that producers in Miraflor do utilize traditional shade systems that theoretically support high levels of biodiversity. However, farmers typically only dedicate 10-25% of their land to coffee. The result is a small area of coffee surrounded by a matrix of shade-less agriculture. Therefore, while small-producers typically utilize diverse shade systems, other land-use practices reduce the effectiveness of these plots in conserving biodiversity. In addition, producers placed an emphasis on the importance of quality in order to take advantage of rapidly growing specialty markets. This suggests that conservation efforts in coffee landscapes should acknowledge the role quality plays in the changing marketplace. *Key Words: coffee, conservation, livelihoods, Nicaragua*

Introduction

Recent conservation literature discusses the importance of looking beyond officially protected parks and biological reserves for successful long-term preservation of biodiversity and recognizes the important role that sustainable forest agriculture, or agroforestry, plays in conservation (e.g., Perfecto et al. 1996; Vandermeer and Perfecto 1997; Steinberg 1998; Moguel and Toledo 1999; Donald 2004; Schroth et al. 2004). The best studied agroforestry system in the Latin American tropics is that of coffee. Indeed, coffee has received a great deal of attention from the conservation community and it is now well documented that certain coffee production systems (referred to hereafter as

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traditional) contain levels of biodiversity comparable to those of surrounding forests. However, dramatic changes in the global coffee market over the last 30 years threaten traditional coffee landscapes as small-scale farms utilizing diverse agroforestry systems are being replaced by large-scale, shade-less monocultures. This paper investigates the production systems and livelihood strategies of small-scale coffee producers in an area of northern Nicaragua in order to better understand the role these producers play in the conservation of biodiversity.

Coffee and conservation

To conservationists the most important characteristic of coffee producing regions is their significant overlap with "hotspots of biodiversity" and other ecologically important areas (Myers et al. 2000). Perfecto et al. (1996: 600) describe the importance of coffee farms as a refuge for biodiversity not because of the total land area covered but because of their "location in areas particularly hard hit by deforestation." In discussing the importance of shade coffee in Mexico, Moguel and Toledo (1999) point out that while the lowland habitats are extremely species rich, montane habitats, ideal locations for coffee cultivation, are home to a vast number of endemic or geographically restricted species. They add that of the 155 regions crucial to the conservation of Mexico's biodiversity, 14 are adjacent to or overlap with major coffee producing regions.

El Salvador represents a dramatic example of traditional coffee production systems as a vital means for conservation. In the last several decades El Salvador has suffered from one of the highest deforestation rates in the world. Today, only 5 percent of original forest cover still stands (Koop and Tole 1997). This has not, however, caused the complete ecological crisis that might have been expected in terms of biodiversity loss. Many researchers attribute the lessening of the ecological crisis to the vast area covered by traditional shade grown coffee farms. In fact, trees used as shade for coffee production represent approximately 60 percent of El Salvador's remaining forest cover (Rice and Ward 1996). Thus, traditional coffee landscapes hold great appeal and importance for biodiversity preservation.

Changing landscapes

Although many conservationists now recognize shade coffee ecosystems as an important means for conservation, traditional coffee landscapes are rapidly changing. Since its introduction to the Neotropics in the 1700s, the coffee plant, *Caffea arabica* (Arabica coffee), found its home beneath a natural forest-like canopy in mountainous regions typically above 800 meters in elevation. However, as one researcher states, the coffee farm of Latin America "is unbecoming what it has been for scores of years" (Rice 1999: 556). This process of unbecoming is mainly attributed to the widespread modernization, or technification, of coffee farms through the use of chemical inputs and the development of sun-tolerant varieties. According to estimates cited by Rice (1999), some level of modernization has affected roughly 67 percent of northern Latin American farms (the area from Colombia to Mexico) and 26 percent have been fully transformed to modern systems. The social and environmental consequences of this process of "unbecoming" are only now being fully understood as they manifest themselves in the landscapes of Latin America.

A crop of global significance

From a global perspective, coffee is of significant economic importance. Coffee is the world's most traded commodity next to petroleum and is produced in roughly 85 countries. Globally, 20-25 million families depend upon coffee for their livelihoods (Bacon 2005). Within the international coffee industry, northern Latin America is perhaps the most important region and accounts for 34 percent of the world's production and covers 3.1 million hectares or 30 percent of the world's coffee area (Rice 1999; Perfecto and Armbrecht 2003).

Throughout northern Latin America, 700,000 small-scale coffee producers make up the bulk of coffee farmers in the region. Central America alone is home to 240,000 micro or small-scale farmers (Rice and Ward 1996). As defined by Bacon (2005), micro-producers are completely dependent upon family labor while small-scale producers often employ day laborers during the coffee harvest when a large amount of work is required over a short period of time. Typically, micro-producers cultivate areas less than 3.5 hectares while small-scale farmers work farms between 3.5-14 hectares. In general, wealthy elites and massive agro-industrial companies own the majority of farms larger than 14 hectares and use highly technified production methods.

The coffee crisis

Recent trends in the coffee industry have devastated producing families. In 2001, prices plummeted from $1.20/lb to $0.45/lb (Bacon 2005). Prices from 2001 are the lowest prices in 30 years or 100 years if adjusted for inflation. Just four years prior to 2001, farmers earned as much as $3.00/lb. Prices remain so low that many growers are unable to even meet production costs, estimated to be between $0.50-$0.70/lb (Varangis et al. 2003). The results of this price collapse have been overwhelming, giving rise to what many now refer to as the coffee crisis. The coffee crisis stems from several major changes in the global market. The main cause is overproduction that has resulted in the buildup of inventories in both consuming and producing countries and a dramatic drop in prices (Varangis et al. 2003). In addition to over-supply, structural changes in supply are impacting the market. Among these are new processing techniques that allow for increased substitution of the lower quality *robusta* (as opposed to arabica) beans in blends without significantly lowering the overall quality. As a whole, these changes have lowered prices of the low-end coffees (Varangis et al.2003).

The rise of specialty markets

In an effort to maintain traditional coffee landscapes and production methods, a variety of specialty markets and certifications recently emerged. These new certifications consist of three main types: organic, shade, and Fair Trade. Organic coffees use chemical-free methods of production and are independently certified by several organizations. Shade coffee certifications assure that production methods incorporate diverse shade canopies that provide important habitats for wildlife and maintain important ecological processes. While both organic and shade certifications are production based, the Fair Trade concept is based upon the commercialization process. Fair Trade certifications attempt to ensure an equitable price to producers for their coffee and work to link producers directly with roasters and therefore forgoing the need to sell through intermediaries. While all three certification types attempt to confront the changing dynamics of the industry by providing price premiums to growers, each is pursued individually and is not contingent upon meeting the criteria of the other certifications.

Many researchers now recognize that social and biological goals must be integrated if long-term solutions to the coffee crisis and modernization trends are to be reached (Perfecto and Armbrecht 2003; Philpott and Dietsch 2003; Perfecto et al. 2005). Perfecto et al. (2005) demonstrate how price premiums for more densely shaded plots need to be sufficiently high to offset opportunity costs associated with a reduced yield. Farmers need to be adequately compensated if conservation objectives are to be met. Several researchers suggest linking shade-certification with fair-trade certification (Perfecto and Armbrecht 2003; Philpott and Dietsch 2003). Since small-scale coffee producers are thought to maintain traditional production methods that are congruent with conservation objectives, both the social and biological aspects of this approach appear to be compatible. Yet, little research has been conducted to evaluate the shade systems incorporated by small-holders to determine if their production methods correspond with conservation objectives. In addition, most studies examining the ecological benefits of shade coffee focus on individual plots and remove them from their contextual landscapes. So while a moderately diverse coffee plot located between two otherwise disconnected forest patches can play an important role as a corridor and in establishing habitat connectivity for many species, even the most diverse coffee plot surrounded by a sea of intensive agriculture and pasture is of little value for long-term conservation.

Building on recent research, this study investigates the relationship between small producer coffee plots and their incorporation of different shade systems, and references the significance of the shade cultivation system in the surrounding landscape in a community in northern Nicaragua. Two main objectives guide the research. The first is to document the shade systems of small-producers to evaluate if they do indeed cultivate coffee using a shade system that can potentially benefit biodiversity. The second objective is explore the various livelihood strategies being used by small-producers in the midst of the coffee crisis that allow them to continue utilizing these shade systems. The results presented are exploratory and attempt to address a complex topic from several different perspectives in order to provide insights from a different geographic area to a conservation issue that has been largely dominated by research from southern Mexico. It is also hoped that such results can identify several areas for more focused empirical investigation on a much-debated issue in the conservation community.

Study Site

This investigation was conducted at the Miraflor-Moropotente National Protected Area (Miraflor) located 17 km NE of Estelí in the Jinotega province of northern Nicaragua (Figure 1). The Miraflor section of the protected area contains approximately 5,800 hectares and ranges between 800-1400 meters in elevation. The area contains several distinct climatic zones starting from the lower elevation dry zone to an intermediate dry forest to an upper humid zone or cloud forest. The area is also home to 37 human communities dispersed throughout the reserve (Ravnborg 2002). Communities range in size from only a couple of households to larger communities with 50 or more households. In total, Miraflor is home to approximately 950 households (Saalismaa 2000). This research was conducted in the upper humid zone in and around the coffee producing communities of El Cebollal, La Pita, and El Sontule. These communities were chosen since they are in the heart of the coffee producing area of Miraflor and based upon suggestions by management of the largest coffee cooperative in area, UCA-Miraflor (*Unión de Cooperativas Agropecuaria-Miraflor*).

In the 1980s Miraflor was at the agricultural frontier of Nicaragua. Under Sandinista agrarian policies, Miraflor was settled and communities were organized into cooperatives. UCA-Miraflor was organized in 1990 at the end of the Sandinista era in an attempt to protect the interests of beneficiaries of the land reform policies of the 1980s (Ravnborg 2002). It remains the largest agricultural organization in the area today. Other smaller cooperatives are also located within the reserve. Additionally, several coffee producers are members of cooperatives located outside of Miraflor or commercialize their coffee through these cooperatives as nonmembers. Due to the settlement of the area under the Sandinista regime and the later efforts of the cooperatives, agriculture in Miraflor remains largely in the hands of small-scale producers and therefore presents a logical site to investigate the land-use practices of small-scale coffee producers.

Figure 1. Map of Nicaragua showing the location of study site.

In the early 1990s, members of UCA-Miraflor explored the possibilities of declaring Miraflor a nationally recognized protected area. Citing high rates of deforestation and the contamination of drinking water from increased use of agro-chemicals as their motivation, members made their case to the Estelí district council to jointly pursue protection for the area (Ravnborg 2002). Miraflor received recognition as a protected area by the *Ministerio de Ambiente y los Recursos Naturales* (MARENA) in 1996. This status was finalized by Nicaraguan legislation in 1999 that called for distinct management categories based upon classifications of The World Conservation Union (IUCN). Miraflor, thus, is classified as a "protected landscape", a protected area that seeks to maintain the traditional interactions between people and their environments and corresponds to IUCN category V (Possingham et al. 2006: 512, Ravnborg 2002). The efforts of local producers to officially protect Miraflor demonstrates the desire of many residents to balance both the ecological and economic needs of the area and presents an ideal location for a case study that examines this effort in its coffee producing communities.

Methods

This paper is based upon a combination of methods carried out during field visits to northern Nicaragua in December of 2003 and November and December of 2004. Living with local coffee producing families during both field visits permitted an in depth view of life in a coffee community in Nicaragua. Participant observation in the coffee harvest and work at coffee processing facilities help to better understand the coffee commodity chain from cultivation to export from the region. The classification of coffee plots and semi-structured interviews were carried out during the 2004 visit.

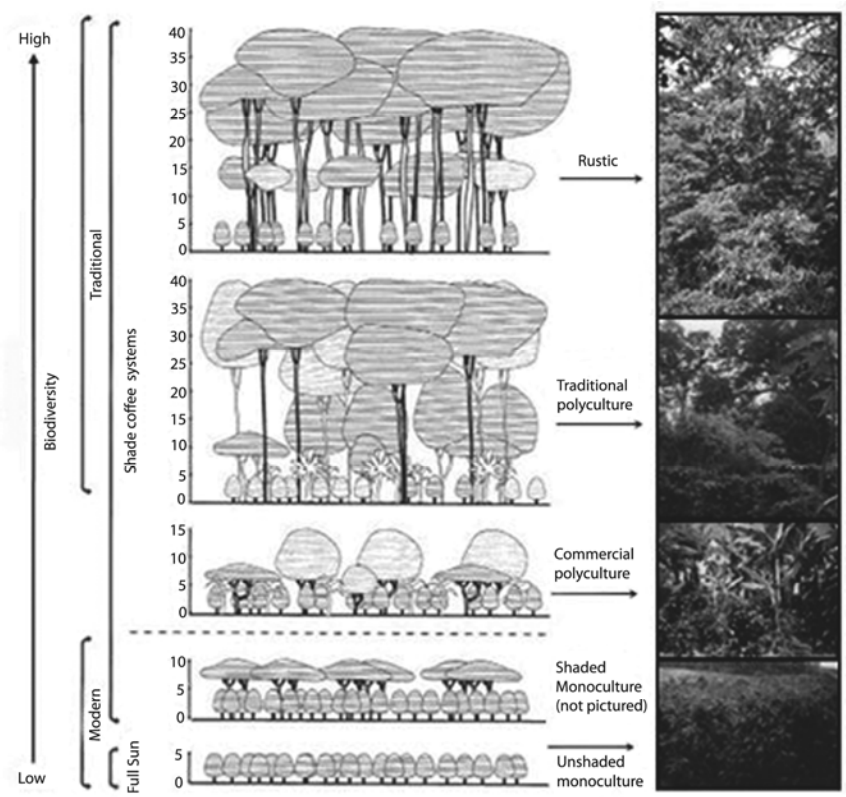

Figure 2. Left: the five major coffee production systems (adapted from Moguel and Toledo (1999)). Right: an example of plots from Miraflor and how they fall into the production systems classification.

To investigate the role small-producer's coffee plots play in conserving biodiversity, each plot evaluated in the community under study was classified into one of five main production systems described by Moguel and Toledo (1999) (Figure 2). The typology provided by Moguel and Toledo (1999) is used widely in conservation and ecological literature to distinguish between different coffee production systems (e.g. Perfecto et al. 2003; Hietz 2004; Mas and Dietsch 2004; Perfecto et al. 2004; Perfecto et al. 2005; Pineda et al. 2005). Although the typology is intended to describe production systems in Mexico, we found it to accurately describe the systems found in northern Nicaragua.

The five main production systems represent an intensification gradient with the unshaded monoculture system at one extreme and the rustic system on the other. Since a more thorough analysis of biodiversity levels on individual coffee plots is beyond the scope of this investigation, the classification scheme is used as a proxy and is based upon the assumption that biodiversity levels are lowest in unshaded monoculture systems and increase as the production systems decrease in intensification and reach their highest levels of biodiversity in rustic systems (Perfecto et al. 2003). Therefore, we assume that the greatest amount of biodiversity is found in the rustic and traditional polyculture, followed by the commercial polyculture, and the lowest levels are found in the shaded monoculture and the unshaded monoculture. Although biodiversity levels in the different systems are highly taxa dependent, the general pattern of biodiversity declines due to decreasing structural complexity of vegetation, loss of canopy cover, and increases in intensification has been empirically documented (Mas and Dietsch 2003; Perfecto et al. 2003; Mas and Dietsch 2004; Perfecto et al. 2005).

In order to classify each producer's coffee plot into one of the five main production systems, the first author walked at least 3 transects through each plot.[1] Following the Moguel and Toledo (1999) typology that takes into account shade-tree diversity, the presence of other cultivars, and canopy height, each coffee plot was evaluated and classified. In each case, the plots clearly fit the criteria for one of the production systems and presented no major obstacles in their classification. In total, 28 plots were evaluated representing an area of approximately 150 hectares and were chosen using a snowball sampling method.[2] During the fieldwork, a local coffee producing family hosted the first author and facilitated snowball sampling of coffee growers in Miraflor. Simply, the host family introduced the first author to neighboring producers who in turn referred him to other farmers. Only plots of small-scale (3.5-14 hectares) and micro-producers (<3.5 hectares) were selected.[3] Using the Moguel and Toledo (1999) classification system as a proxy for biodiversity, as opposed to measuring biodiversity on individual plots, allowed us to consider more plots than would be possible with another approach. This tradeoff enabled us to more extensively evaluate the study area as opposed to intensively evaluating only a couple of plots.

Results from categorization are reported as number of plots observed as opposed to the areal extent of plots. This distinction is important since large plots that make up substantial portions of the total area are given the same weight as small plots that account for little of the total area observed. For the purposes of this study, reporting of the number of plots observed seems reasonable since only micro and small-scale producer plots are included. Thus, all plots reported are 14 hectares or less with most plots being between 2-5 hectares. Future research that includes a more quantitative analysis should consider areal extent of production systems.

In addition, detailed notes were taken about the areas immediately surrounding coffee plots. Specifically, it was noted if plots bordered forest fragments, other coffee plots, or other agricultural lands. This method provided information about not only the plot, but the surrounding matrix as well.

In order to better understand the impacts of the coffee crisis on small-scale producers' land use practices, the first author conducted 23 semi-structured interviews with coffee producers.[4] During these interviews, producers were asked about their strategies for dealing with the coffee crisis. Specifically, informants were asked about the role of specialty markets and certifications, the production of other crops, and their plans for the future. The semi-structured interview format also allowed farmers to discuss topics that they felt were important. Informants were selected for interviews by the use of the same snowball sampling method described above. The purpose of these interviews was to evaluate how the coffee crisis has impacted small producers and to determine their strategies for confronting it. More specifically, these interviews attempt to understand how current livelihood strategies influence the use of different shade systems as well as other land-use practices that may be important to conservation in coffee landscapes. These interviews are complemented by 2 semi-structured interviews conducted with coffee cuppers (tasters) and numerous informal interviews with producers, migrant workers, and other community members. In addition to the semi-structured and informal interviews, the first author was a participant observer during the coffee harvest in December 2003 and during 2 coffee tasting sessions in December of 2004. These participatory methods and informal interviews help contextualize data gathered from the classification of plots and semi-structured interviewing.

Results and Discussion

Results from the categorization of coffee plots displayed in Table 1 show that a vast majority of producers (roughly 85%) include at least some shade in their production system. Additionally, a substantial portion of producers (35%) utilize either a traditional polyculture or rustic production system, the two systems that are most compatible with conservation objectives. When the data are narrowed to only confirmed resident producers (defined here as producers that live within the protected area versus people own land but do not live in the area), an even higher percentage utilize diverse shade systems as shown by Table 2. Additionally, no resident producers utilized an unshaded monoculture system.

Table 1. Coffee Production Systems of All Observed Producers

Coffee Production System	Number of Plots	% of Total Plots
Unshaded Monoculture (full sun)	4	14.3%
Shaded Monoculture	5	17.9%
Commercial Polyculture	9	32.1%
Traditional Polyculture	8	28.6%
Rustic	2	7.1%

Table 2. Coffee Production Systems of Resident Producers

Coffee Production System	Number of Plots	% of Total Plots
Unshaded Monoculture (full sun)	0	0%
Shaded Monoculture	4	19.0%
Commercial Polyculture	7	33.3%
Traditional Polyculture	8	38.1%
Rustic	2	9.5%

Results from interviews show a consensus within the community that the Miraflor area has not been as affected by the coffee crisis to the same degree as other areas in Nicaragua. Producers expressed three major factors for the area's relative insulation from the effects of the coffee crisis; 1) producers in Miraflor are not entirely dependent upon coffee for their livelihoods, 2) Miraflor has developed direct selling relationships with several roasters in the US and Europe who favor the high quality beans produced in the area, and 3) many producers have been able to enter the specialty coffee market (especially organic) and escape falling prices. However, all the interviewed farmers expressed concern about low coffee prices and one said that 2004 might be his last year producing coffee.

Furthermore, on the west side of Miraflor, approximately 50 producers are organized in the Juan Jiménez Cooperative. This cooperative owns approximately 450 manzanas (1 manzana = 0.7 hectares) of agricultural land of which 50 are dedicated to coffee. All of the coffee land is a contiguous parcel in which each cooperative member is responsible for a 1 manzana portion. The remaining 400 manzanas are equally divided amongst the members and are used for the production of food crops (e.g., beans and maize) and surround the coffee plots. Although the entire 50 manzana parcel was not thoroughly evaluated, the observed portions are classified as traditional polycultures. This shade system appears, based upon conversations with cooperative members, to be consistent throughout the 50 manzana area.

The shade categorization of Miraflor plots illustrates that many small producers utilize production systems that are thought to be compatible with biodiversity conservation. That is, the highly shaded plots theoretically provide more diverse habitats for a wide variety of taxa (Perfecto and Snelling 1995; Gallina et al. 1996; Greenberg et al. 1997; Mas and Dietsch 2004; Pineda et al. 2005). Resident producers utilize more diverse shade systems than non-resident producers as shown by Tables 1 and 2. This difference is probably driven in part because many resident producers depend upon their land for the production of food crops such as bananas and oranges as well as trees for firewood that are incorporated in diverse polycultures. Non-resident producers, however, do not need and cannot attend to these crops and therefore forgo a diversified yield in order to maximize coffee production through a more technified production system.

The conclusion that producers' coffee cultivation practices are congruent with conservation objectives is complicated by the use of remaining land in their parcels. The majority of small producers also produce other crops and typically only dedicate between 10-25% of their land to coffee. The remaining 75-90% of their land is used for the cultivation of food crops such as beans and maize and pastures mainly for dairy cattle (Figure 3). These crops are produced mainly for personal consumption and, to a lesser degree, for sale in Estelí markets. Land dedicated to crops other than coffee contain much reduced levels of shade and biodiversity and have limited value for conservation.[5] The cultivation of crops other than coffee, farmers stressed, is a vital alternative to income from coffee, especially in the harder times brought about by the coffee crisis.

Two producers, however, broke the trend of dedicating 10-25% of their land parcels to the cultivation of coffee and cultivated over 50% of their land in coffee. As one producer commented in regards to a neighbor's practices, "that's too much. What happens if they can't sell it all? After all, you can't eat coffee." By planting the majority of their land in food crops, farmers reduce

Figure 3. Miraflor coffee producer planting beans, one of several food crops grown by producers to diversify crop production.

their vulnerability to the highly unstable international coffee prices. Even though most growers depend upon coffee yields for access to hard currency, in a bad year with low prices they will not starve. Planting a larger percentage of their land in coffee is equivalent to rolling the dice and gambling on the commodities market. Many producers were also skeptical of the longevity of the higher prices provided by their sales to specialty coffee markets.

Because small-holders need to mitigate risk, they diversify their crops. This results in a fragmented landscape where a small area of significant canopy cover in coffee cultivation is surrounded by a larger area of minimal or no canopy cover dedicated to subsistence crops and other cash crops. Based on current knowledge of conservation biology and applications of island biogeography theory (MacArthur and Wilson 1967; Diamond 1975; Higgs 1981; Bierregaard et al. 1992), small "islands" with high levels of biodiversity (e.g., small-producer coffee farms) surrounded by a sea of low biodiversity agriculture (beans, maize, etc.) may not be viable locations for long-term conservation. Since it is still uncertain whether coffee plots can maintain biodiversity levels in perpetuity or if they are dependent upon continual colonization from surrounding forest fragments, biodiversity levels may be determined by the proximity of coffee plots to ecologically productive forest patches (Perfecto and Vandermeer 2002). In Miraflor, coffee farms are scattered throughout the area and display differing levels of interconnectivity to other farms and forest fragments. As a whole, the area does not fit well with an idealized conception of coffee plots as a surrounding buffer for protected forests. Instead, coffee plots often border sections of forest fragments but are restricted in their role as buffers by other agricultural or pasture lands. This is due to the tendency of individuals' lands to be consolidated around the home. The result is a landscape mosaic dominated by agricultural fields and pastures that leaves coffee plots and forest patches relatively isolated (Figure 4). Isolated coffee plots and forest fragments in similar landscape patterns were shown to have reduced bird abundance and diversity (Wunderle 1999; Perfecto et al. 2003), which highlights the need to consider the greater landscape in which traditional coffee plots are embedded, an approach taken by few studies.

Figure 4. A typical landscape mosaic in Miraflor showing a forest patch (background), a commercial coffee polyculture (highlighted), and bean fields and pastures (foreground).

As has been pointed out by several studies (Laurence 1991; Bierregaard et al. 1992; Perfecto and Vandermeer 2002; Laurence et al. 2002), the matrix surrounding forest fragments may be just as important for conservation as the fragment itself. In coffee landscapes, traditional coffee farms (rustic and traditional polycultures) are thought to represent a high quality matrix while intensively managed coffee farms (shaded monocultures and unshaded monocultures), pastures, and other intensive agriculture are thought to represent a low quality, or hostile, matrix for many species (Perfecto and Vandermeer 2002; Mas and Dietsch 2003; Perfecto et al. 2003; Mas and Dietsch 2004; Williams-Guillen et al. 2006). In Miraflor, since the vast majority of small-scale producers (91%) planted only 25% or less of their land in coffee and only 36% of the observed coffee plots were classified as rustic or traditional polycultures, the vast majority of the landscape in Miraflor can be considered a low quality matrix. This questions the efficacy of achieving conservation in such highly fragmented landscapes dominated by a low quality matrix.

The evidence gathered from the Juan Jiménez cooperative suggests that these impediments for conservation can be overcome. All the cooperative coffee land is contiguous and effectively buffers surrounding forest fragments and improves the surrounding matrix. The spatial distribution of forest fragments, coffee plots, and other agricultural lands more closely represent the idealized use of coffee as a forest buffer than any other location at the study site. Although the current land-use patterns were not organized for conservation purposes, it suggests that conservationists can work with existing community organizations to achieve similar landscape patterns. A potential strategy is to promote specialty certifications at the cooperative level for small-scale producers in addition to certifications at the individual farm level. Such a strategy would impact a greater area and could promote less fragmented landscapes similar to the one observed on the Juan Jiménez cooperative lands.

Unintended outcomes of the "benefits" of shade grown coffee

While researchers and conservationists have lauded shade coffee for the ecological benefits it provides, several researchers have pointed out that shade coffee may work against conservation objectives in some instances. Rappole et al. (2003a, 2003b) argue that the promotion of shade coffee through price premiums is encouraging producers to expand into surrounding forests in order to convert them to coffee. They point out that while certain shade coffee systems contain high levels of biodiversity, they are not equivalent to surrounding forests. In Miraflor, the first author observed at least three locations in which the forest understory had recently been cleared and planted with coffee seedlings (Figure 5). While he was unable to confirm the producers' motivations for the expansions, based upon comments from neighboring producers, we suspect that these producers have secured access to the organic market and are expanding production to capitalize upon price premiums. While these conclusions are highly speculative, it is possible that specialty markets, like the organic market, that do not have regulations preventing certification for coffee plots recently converted from forests are threatening conservation by encouraging expansion into undisturbed areas through economic incentives. Such concerns are not isolated to evidence from this research. For example, at Miraflor, MARENA has acknowledged the threat that expanding coffee poses and has prohibited its further expansion in a proposed management plan (Ravnborg 2002). Rappole et al. (2003a, 2003b) have expressed concerns over coffee expansion into highly threatened pine-oak forests in Central America. In fact, expanding coffee production has historically been a major cause of deforestation in Central America (Donald 2004). Yet, little research has been done to determine the causes and motivations for such expansions. More thorough research that specifically addresses these concerns is warranted.

Figure 5. A recently thinned forest patch planted with coffee seedlings.

A focus on quality

Perhaps the most unexpected result from discussing strategies for dealing with the coffee crisis with producers was the importance they placed on continually improving the quality of their coffee beans. In fact, there was a general consensus among farmers that this was the single most important factor for improving their livelihoods. As one farmer told me, there may be a huge supply of cheap coffee on the market but the demand for high quality beans is rapidly growing. Developing a reputation for high quality enables producers to establish lasting and direct relationships with roasters abroad. This method of commercialization is also the most profitable for producers (Bacon 2005). Therefore, producers are focusing on quality improvement before pursuing specialty certifications. Perhaps this strategy was adopted because of the hard lessons learned by World Bank projects in El Salvador and Mexico, which focused on promoting shade-coffee. Through both of these projects, farmers learned that environmental and social labels would not receive high premiums in the marketplace if the coffee were not of the highest quality (Varangis et al. 2003). The importance of quality, however, has been largely absent in the discussion of "coffee and conservation" in recent literature.

In order to promote this strategy, a quality improvement project, funded by USAID, was launched after the devastation caused by Hurricane Mitch in 1998 (see Bacon 2002). Through this project, 9 cooperatives in northern Nicaragua, including UCA-Miraflor, built coffee tasting laboratories and trained young members as professional coffee cuppers (Figure 6). The project's aim is to develop the technical capacity of cooperatives to ascertain and improve the quality of their product. The hope is that exceptional quality will allow producers to assert themselves in the specialty markets and control the price of their coffee.

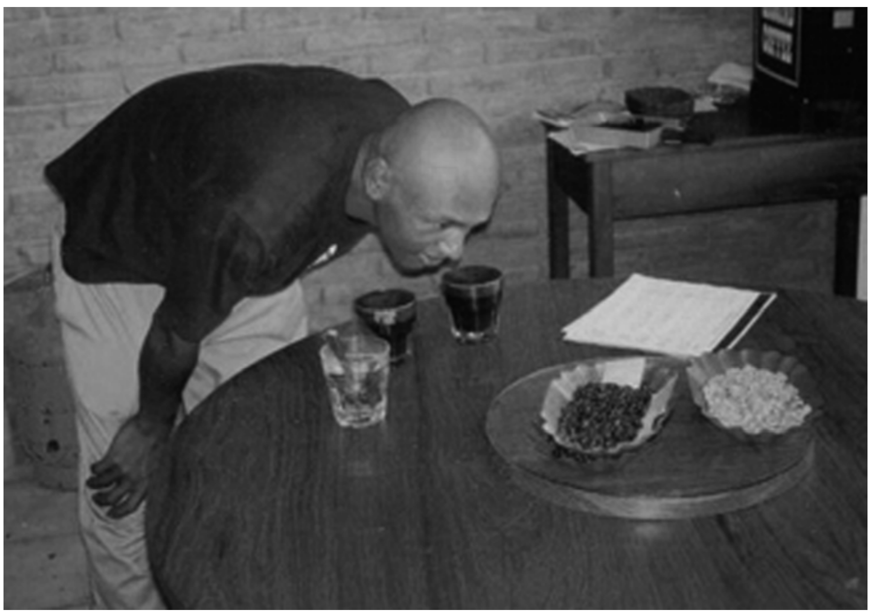

Figure 6. An UCA-Miraflor coffee cupper assesses the quality of a cooperative member's recent crop.

While quality is a critical aspect for farmer's coping with the coffee crisis, many farmers do not fully understand the commercialization process. One producer expressed his frustration to me by stating "we know how to produce high quality coffee. We know everything up until this point (points to drying coffee beans). It's the business side we don't understand, commercializing the coffee, that's what we need to figure out." The tasting laboratories address one piece of this problem. It empowers producers by giving them first hand knowledge of their product. However, producers and cooperatives may still lack the technical business capacity to fully assert themselves in the global market. Successful conservation initiatives in coffee landscapes must address quality issues and help producers in the commercialization process to be successful.

Conclusions

Coffee production in Miraflor typically utilizes diverse shade systems with resident producers incorporating the most significant systems for biodiversity conservation. However, the necessity of farmers to commit only 10-25% of their land to coffee fragments the landscape into a mosaic of forest fragments, coffee plots, and other shade-less agricultural fields. Therefore, conservation goals and livelihood strategies are not entirely compatible. This conflict is reconciled in one location by the Juan Jiménez cooperative. Here the cooperative avoids a fragmented landscape by cultivating coffee in a contiguous ring around a forest patch. This demonstrates the important role current coffee cooperatives can play in improved coordination and planning for conservation purposes. Evidence from this research also demonstrates the potential threat that the demand for specialty or certified coffees can pose to surrounding forests by stimulating expansion into unused forests. Long-term conservation must protect forest patches especially in such highly fragmented landscapes. Finally, an emphasis on continual quality improvement is necessary for small-scale producers in order to take advantage of the rapidly growing specialty markets. Conservation efforts in coffee landscapes must acknowledge the role quality plays in the changing marketplace.

Notes

1. Transects were not random and often followed established trails through plots. The main objective of these transects was to ensure that the majority of each plot was observed instead of trying to classify the plots from the periphery.
2. These numbers do not reflect the individual farm plots associated with the Juan Jimenez Cooperative since each plot was not evaluated individually.
3. Only one larger coffee plot (approximately 20 ha) was observed in the area and thus excluded from the sample.
4. The first author attempted to conduct interviews with each head of household or owner of the classified plots. This was not possible in every instance, especially in the case of non-resident producers, and therefore several interviews were conducted with other knowledgeable household members or caretakers. In addition, 5 producers or caretakers granted access to the plots for classification but declined to be interviewed.

5. An exception to this is the conservation of agro-biodiversity. Traditional agricultural fields often maintain important, genetically diverse varieties of major food crops that are of significant value for the conservation of biodiversity.

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