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Coffee, Conservation, and Commerce in the Western Hemisphere

**How Individuals and Institutions Can Promote Ecologically Sound Farming and Forest Management
in Northern Latin America**

Written By:

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Smithsonian Migratory Bird Center

Through a combination of research, education and training, the Smithsonian Migratory Bird Center is dedicated to fostering greater understanding, appreciation, and protection of the grand phenomenon of bird migration. The Center's work bridges the academic, policy-making, and public worlds to coordinate efforts to protect migratory birds and their habitats. Recognizing that migratory birds do not recognize political, cultural or economic boundaries, the Center's efforts extend throughout the Americas, to protect all the habitats that are crucial to the annual pilgrimage of migratory birds in the Western Hemisphere. The Smithsonian Migratory Bird Center is located at the National Zoological Park in Washington, D.C.

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FOREWORD ([Table of Contents](#))

For a beverage made from a humble seed, coffee is inordinately important in our modern world. From the standpoint of consumption, this is easily seen. Just imagine yourself placed at any random point in the United States. How long would it take you to find the closest cup of coffee? For that matter, how easily could you pick up a double tall latte? Coffee is equally important to the developing world where it is produced. Coffee is a major source of foreign exchange for dozens of tropical countries and provides an opportunity for thousands of farmers to earn cash income off small parcels of land.

Sipping a cup of coffee is a ritual that is played out millions of times a day throughout the world. It is an act that ties together consumer, retailer, roaster, broker, producer and farm laborer in complex relationships about which we rarely ponder. But the connections are deeper than mere commerce. For example, many of the millions of migratory birds that criss-cross the continents have come to depend upon the traditional coffee farms that still produce much of the coffee we drink. In many areas where deforestation is a *fait accompli* shade coffee farms provide a refuge for many forest loving birds and other organisms. Migratory birds are emblematic of the importance of coffee to both the local environments where it is grown and the global environment that we share.

In an effort to provide more coffee and make more money, many coffee farmers have modernized the traditional coffee farm. A modern coffee farm has fewer shade trees and requires more chemical inputs. Over a mere two decades, the face of the land of coffee growing regions has been dramatically changed. The Smithsonian Migratory Bird Center has been interested and concerned about the impact this conversion will have on populations of migratory birds. We believe that this conversion, although occurring on

agricultural lands, is a form of deforestation. Moreover, the ramifications of these changes go beyond birds to issues of permanent soil loss, reductions in carbon sequestration, increased doses of hazardous chemicals and pollutants, and quality of life for the farmers and laborers that grow, pick and process coffee berries.

Robert Rice and Justin Ward have produced a comprehensive analysis of the issues involved in coffee conversion. More importantly they have taken a giant step in producing a set of specific recommendations to address the issue at different levels, from working with growers, educating consumers, effecting National Policies and influencing the approach of bilateral and multilateral development agencies. Within this buffet of diverse approaches, the most tantalizing is the harnessing of market forces to promote ecologically sustainable coffee production. Consumers concerned with maintaining an abundance of migratory birds, protecting forest organisms, and helping promote the environmental health of tropical regions, may be willing to help accomplish these goals by purchasing coffee from traditional shade coffee farms. At this point in time, it is difficult to make such a consumer choice. However, when such a product is more widely available, it will bring producers, roasters, and coffee drinkers together in a mutual effort to protect our common resources.

--Russell Greenberg, Director, Smithsonian Migratory Bird Center

Yum! so sweet is the taste of coffee,
more beloved than a thousand kisses,
smoother than muscatel wine.

Coffee--I must have it,
And someone who wants to please me
ah--he will just present me with coffee!

--Liesgen's Aria to her father in Bach's Coffee Cantata,
Hush, Don't Chatter (1732)

I. INTRODUCTION ([Table of Contents](#))

Coffee drinkers historically have had little reason to contemplate the environmental dimensions of their habit. Yet, over the past 15 to 20 years, dramatic changes associated with the ecological, social and economic sustainability of coffee have redefined coffee production in northern Latin America. Only recently has it come to light that the way coffee is produced profoundly affects migratory bird diversity and other ecological indicators of environmental health.

For coffee devotees in the North, getting a good cup of coffee each morning ranks high on our personal comfort list. Many of us now talk about different coffee blends as wine tasters talk about vintage wines, feeling satisfied that we understand so much about this coveted beverage. But to feel really informed, we should understand some of the changes occurring at the production end of that coffee.

From Colombia to Mexico, an industrial transformation of the coffee sector threatens the traditional coffee agroecosystem through the loss of biodiversity, habitat fragmentation, pesticide poisoning and soil erosion. In the simplest terms, the change is from shade coffee to sun coffee. The region harbors some of the highest levels of biodiversity on the globe--levels that are maintained to a surprisingly high degree within the

traditional coffee system. Changing the structure and management of this system may spell trouble for the region's overall environmental health, as well as for the economic resilience of small growers and rural communities. Coffee management choices in the future will profoundly affect conservation objectives in countries throughout the hemisphere. One example is El Salvador, where coffee plantations represent about 60 percent of the nation's remaining forested area.

The transformation involves switching from the traditionally canopy-covered coffee farm with a mixed plant community in the overstory, to a virtual monoculture of coffee that may include moderate to sparse shade cover of a single species, or, in some cases, no shade at all. The path from the shade into the sun is dressed with new fertilizer-responsive varieties of coffee and a list of agro-chemicals. Of the 2.8 million hectares (6.9 million acres) planted to coffee in Mexico, Colombia, Central America and the Caribbean through the early 1990s, 1.1 million hectares (about 40 percent) have been converted to sun coffee or "technified." And while the changes have occurred too recently to be evaluated in terms of total impact upon the region, the overall land and food security of small producers will surely be affected by the transformation to more intensified production.

As the map on page three shows, some countries have embraced the transformation of their coffee sector much more heartily than others (see Table 1 for area figures and sources). Costa Rica and Colombia, for instance, display relatively high levels of technified coffee lands. Although producers in some areas have recently begun to re-introduce and increase shade levels, the overall trend in the past two decades has been one of shade removal or reduction, resulting in landscape transformations with long-term ramifications for conservation and environmental protection.

Interestingly, recent years have seen an increased awareness of the environmental and social links to coffee on the part of producers, marketers and consumers. Producer organizations throughout northern Latin America, usually formed into peasant cooperatives, are beginning to address coffee's environmental aspects by maintaining a mixed shade cover. Marketing strategies based on organic coffee or social justice and fair commodity prices paid to farmers are emerging in many countries. Consumers are now faced with a growing array of coffees produced beneath a variety of systems, but seldom realize the distinction being made. For those consumers concerned with the environmental and social aspects of coffee, there is an interesting--and vitally important--story to be told.

In this report, we examine the issues related to the industrialization of the coffee sector in northern Latin America, and connect these seemingly distant changes in agricultural production to the morning ritual played out in hundreds of millions of homes throughout the world. We first establish the importance of coffee to the countries of the region, showing how national economies, agricultural area and wage labor evolved to supply the North's coffee craving. Next, we present the changes that have been reshaping the coffee landscape over the past couple of decades--changes that seek to bring greater yields and higher income to the rural sector, but that may be doing so at tremendous environmental and social cost to the region in the long-term. The following section presents the environmental dimensions of modern coffee production, identifying concerns that are both local and global in scope, and contrasting the benefits of shade coffee with the damages resulting frequently from sun plantations. Finally, the report recommends actions on the part of policy makers, private sector businesses, consumers, and coffee growers, processors, and roasters to promote a sustainable future for the environment and economy of northern Latin America.

II. COFFEE A KEY INGREDIENT TO ECONOMIES IN NORTHERN LATIN AMERICA ([Table of Contents](#))

This report focuses on the countries of northern Latin America, which make up a region of extraordinary biological richness. The countries of concern include Mexico, Colombia, much of Central America, and many of the Caribbean nations. Since the latter half of the 19th century, coffee has been an important export for many countries throughout the region. Favorable climatic and processing conditions, ready access to labor, and government programs dedicated to protecting the interests of the coffee sector have enabled these countries to play a central role in supplying the world with quality coffee. In terms of quality, Colombia and Central America figure strongly in world production, historically having enjoyed a five to ten percent premium above international prices for the "mild" (washed) coffees they produce. The premium-quality arabica coffees produced in northern Latin America can sometimes command prices 30 percent above the lower quality robustas or unwashed arabicas, coffees produced for mass consumption.

The portion of foreign exchange it has generated, the area of agricultural land it has occupied, and the number of people it has employed place coffee in a distinctive role in these societies. In Central America, no other crop in history approaches the importance of coffee, with the possible exception of indigo (a plant used as a dye) during Spanish colonial times. Concentration upon coffee production in the 1800s, a time of growing demand spurred by unprecedented global economic growth, provided firm footing for the economies of northern Latin America. Demand soared again during the boom economy that followed World War II. Since World War II, the countries of northern Latin America have provided anywhere from one-quarter to one-third of the world's coffee (see Table 2).

Today, coffee still forms the economic backbone of many of these countries. Coffee exports from Guatemala, for instance, generated \$450 million in 1994/95 season. For the current season, exports are expected to bring in even more revenues. In El Salvador, even amid that country's civil war during the 1980s, coffee exports accounted for 44 percent of the value added (constant prices) to the national economy in 1989. In Costa Rica, coffee exports accounted for anywhere between 20 percent and 30 percent of total exports from 1970 to 1989. Colombia's reliance upon coffee is similar, although on a larger scale than the Central American countries. In 1994, Colombia's coffee exports were valued at over \$1.4 billion.

Coffee obviously generates tremendous labor demands on these countries' societies, a situation that has contoured the rural population for more than 150 years in some nations. Comparatively, other traditional crops produced in northern Latin America rely on less labor. Whereas in Guatemala coffee demands 73 person-days per hectare during its production cycle, food crops like corn and beans require 58 and 61 person-days per hectare, respectively. On small farms, the chores involved in coffee cultivation keep entire families busy, with women and children playing crucial roles. Not only are workers needed to harvest the coffee, but tasks anticipating and preparing for the harvest, such as fertilizer application, weed and pest control, ground maintenance around trees, shade regulation and maintenance of roads and fences, keep permanent work forces occupied all year on many farms. In Colombia, a country with 42 percent of its 33.3 million citizens designated as "rural," nearly 23 percent of the agricultural labor force is involved in coffee.

The prevalence of coffee upon the physical and social landscapes of northern Latin America is considerable.

Its national importance to the region becomes clear by expressing coffee area as a percentage of the "permanent cropland," which refers to that agricultural land devoted to perennial crops and excluding pasture lands for livestock. For the region as a whole, 44 percent of the permanent cropland is covered by coffee (see Table 3).

Coffee is a major source of export income for countries throughout northern Latin America (see Table 4). For several decades, agriculture's share of total exports has declined steadily in countries like Colombia or Mexico, due to increasing reliance upon exports from manufacturing and non-agricultural extractive industries. Yet, while the overall agricultural share has shrunk, coffee's proportional contribution to the sector's earnings has remained unchanged. Wide fluctuations in international coffee prices have nevertheless caused major swings in all Latin American countries' total export revenues from coffee. Prices and export receipts took a sharp downturn for a four-year period following the 1990 collapse of the International Coffee Agreement, but have climbed over the past year and a half following major frost damage to the Brazilian coffee crop.

The structure of these countries' coffee industries is generally skewed toward large numbers of small producers, who often exist at or below the poverty level. Northern Latin America is home to more than 700,000 small coffee producers. They account for the lion's share of coffee farms (see Table 5), while larger producers usually control the bulk of coffee area. Moreover, large producers tend to hold disproportionate amounts of the better quality agricultural land. Throughout Central America in the early 1980s, some 239,000 farmers participated in coffee production. The United States Agency for International Development (USAID) estimated that 86 percent of these could be classified as "small farmers," the majority of whom grow and harvest coffee with the sole help of their families.

Coffee farms often produce more than coffee. It is common among small farms for the household to extract useful products like firewood, construction materials, fence posts, and fruits from the holding, in addition to the coffee harvested each year. The source of these items is the shade tree cover associated with many coffee farms. As peasant producers living precarious livelihoods year to year, such "non-coffee" products provide the family with items that can be used directly or traded locally for other cash or other needed products.

III. TRANSFORMING THE PHYSICAL AND ECONOMIC LANDSCAPE OF COFFEE ([Table of Contents](#))

The coffee landscape of northern Latin America reflects the culmination of the human activities associated with coffee's introduction, acceptance, and spread as it came to replace the cash crops of colonial times and to gain a place of prominence into the late twentieth century. The "traditional" coffee of today has actually evolved since this African shrub was first brought to the New World in the 18th century. Early on, coffee was often placed in the open sun, a practice that growers soon changed by planting shade or placing coffee in areas only partially cleared of their native forests. By the dawn of this century, a production system characterized by diverse shade and biological richness dominated the coffee landscape. Even after World War II and into the last quarter of this century, most countries of the region (with exceptions like Costa Rica) displayed coffee areas blanketed with a variety of shade trees.

But by the 1970s, things began to change quickly and dramatically. Coffee farmers, just like producers of other crops around the world, found themselves face to face with the forces of modernization. Added emphasis to change production technology came from agronomic problems like threats from diseases. The result has been a sweeping tendency to shift from traditional production techniques to more modern ones, a move that usually involves changes in the shade cover, its management, and the use of agrochemicals.

A. The nature of the traditional coffee farm ([Table of Contents](#))

Traditionally, the structural profile of a coffee farm in northern Latin America has resembled that of a forest. With coffee as the understory shrub, a mixed shade cover of fruit trees, banana plants, and towering hardwood species forms a forest-like agroecosystem. Such an agroforestry structure results in a fairly stable production system, providing protection from soil erosion, favorable local temperature and humidity regimes, constant replenishment of the soil organic matter via leaf litter production, and home to an array of beneficial insects that can act to control potential economic pests without the use of toxic chemicals. Traditional coffee, in fact, has been cited as the region's most environmentally benign and ecologically stable agroecosystem.

A strong consideration for the small grower is what the shade coffee system produces in addition to the coffee harvest each year. Indeed, several "non-coffee" products are harvested on a continual basis from traditional coffee holdings. This diversification helps shield small producers from risks arising from the vagaries of nature, international market fluctuations, or societal structures. For many coffee producers in Central America, the mixed nature of shade cover traditionally maintained in coffee provides insurance against uncertainty, and maximum use of limited land holdings becomes an effective survival strategy. The coffee harvest provides income each year, the absolute amount of which depends upon yields and international prices. Other plants and trees in the coffee holding provide a host of products that the grower would otherwise have to buy on the local market (see Box on "Edible, Usable Biodiversity"). A farmer's entire family is often involved in traditional coffee production, especially for the harvest.

Income from selective timber harvest derived from shade trees can be substantial. In studies based on Costa Rican practices, timber stands of *Cordia alliodora* used as shade in densities of 120-290 trees per hectare, can produce a sustainable output of 6-15 cubic meters per hectare per year of commercial wood. Timber output such as this can help provide income security for small farmers; for instance, timber harvests from shaded cacao plantations saw Costa Rican producers through several years of tough financial times in the early 1980s, when plant disease decimated cacao production.

The species composition and structure of a traditional coffee system will vary according to country, ecological zone and grower. But examples from several places within northern Latin America point to the similarities of traditional coffee regardless of location. In particular, producers in many countries make use of shade trees in their coffee holdings, with smaller producers tending to make use of a variety of trees that provide edible fruits. In Nicaragua's southern uplands known as the Carazo district, just south of Managua, traditional coffee holdings have at least 25 species of fruit and timber trees associated with them, many of which are native species to this seasonally dry forest zone. Throughout the region, many farmers plant nitrogen-fixing shade trees belonging to genera such as *Inga*, *Gliricidia*, and *Erythrina*. Small growers prefer to have fruit trees as well, such as citrus, bananas, and guavas. A study in Venezuela showed growers

choosing a mixture of shade trees (distinct from fruit or timber species), fruit trees, bananas and timber species, regardless of the ecological zone in which they happened to produce. The density of shade trees approached 353 per hectare, and total tree density in this study (not counting coffee bushes) reached 561 per hectare in some farm systems.

Edible, Usable Biodiversity ([Table of Contents](#))

Many small coffee producers throughout Central America, Colombia, Mexico and the Caribbean maintain a varied mix of useful trees used as shade for the coffee. Depending upon local ecological conditions, local history of growing practices, and the grower, a "coffee farm" may in fact have a useful array of non-coffee products that come from the farm. On Guatemala's Pacific slope descending from the colonial town of Antigua toward the piedmont city of Esquintla, coffee growers purposefully intersperse citrus, bananas, and a popular palm ("pacaya") within the coffee. These and other fruits offer a ready source of food and/or income when harvested, often during periods that do not overlap with the coffee harvest itself.

Below is a list of trees (some fruit trees--*f*, some timber species--*t*, some strictly shade species--*s*) found in the southern uplands region of Nicaragua. All are sources of firewood.

-
- Common Name Scientific Name Family
 - Aceituno (*s*) *Simarouba glauca* SIMAROUBACEAE
 - Aguacate (*f*) *Persea americana* LAURACEAE
 - Anona (*f*) *Annona spp.* ANNONACEAE
 - Caimito (*f*) *Chrysophyllum cainito* ANNONACEAE
 - Cedro (*t*) *Cedrela mexicana* MELIACEAE
 - Chilamate *Ficus glabrata* MORACEAE
 - Citrus (*f*) *Citrus spp.* RUTACEAE
 - Copel (*s*) *Ficus spp.* MORACEAE
 - Genízaro (*t*) *Pithecellobium saman* LEGUMINACEAE
 - Guabillo (*f*) *Inga spp.* LEGUMINACEAE
 - Guachipelín (*t*) *Diphyssa robinoides* LEGUMINACEAE
 - Guanacaste (*t*) *Enterolobium cyclocarpum* LEGUMINACEAE
 - Guácimo (*s*) *Guazuma ulmifolia* STERCULIACEAE
 - Guayacán* (*t*) *Tabebuia guayacan* BIGNONIACEAE
 - Hule (*s*) *Hevea brasiliensis* EUPHORBIACEAE
 - Jobo (*f*) *Spondias mombin* ANACARDIACEAE
 - Laurél (*t*) *Cordia alliodora* BORAGINACEAE
 - Madero negro (*t*) *Gliricidia sepium* LEGUMINACEAE
 - Mamey (*f*) *Pouteria sapota* SAPOTACEAE
 - Mora (*s*) *Chlorophora tinctoria* MORACEAE
 - Palo de Leche (*s*) *Ficus spp.* MORACEAE
 - Pochote* (*t*) *Bombacopsis quinatum* BOMBACACEAE

- Quitacalzón (*s*) *Astronium graveolens* ANACARDIACEAE
- Zapote (*f*) *Manilkara zapota*. SAPOTACEAE
- *These species are used in traditional coffee, but not found in survey of traditional farms done in 1987.B.
Characteristics of technified coffee

B. Characteristics of technified coffee ([Table of Contents](#))

Beginning in the mid-1970s, a successful push to "renovate," "technify" or "modernize" the coffee sector in much of northern Latin America emerged. The force behind this move came from a fungal disease known as coffee leaf rust (*Hemileia vastatrix*), also known by its Spanish name, *la roya* ("the rust"), spreading throughout the region. The devastating potential of the rust was known from historical records in India and Sri Lanka (formerly Ceylon), where the disease halted coffee production within two decades in the second half of the 19th century. The wind-borne spores finally made a New World landfall in 1970 on the east coast of Brazil, an event that triggered panic throughout the coffee industry in the Americas.

Outbreaks and spread in Nicaragua's southern coffee district of Carazo in 1976 heralded the arrival of coffee leaf rust in Central America, prompting an urgent search for solutions. The most popular response was a technological one proposed by the United States Agency for International Development (see Box on Subsidies for Industrial Coffee Production in Recent Decades). With the coordination and financing of USAID or on their own, governments throughout the region implemented or participated in programs to technify their coffee. For most of the region, coffee leaf rust has not posed the problems originally anticipated. This most likely is due to the high elevation (and hence cool temperature) and/or the prolonged, intense dry season -- physical conditions not conducive to the disease's proliferation -- characterizing much of the coffee zone.

Technification -- now more commonly referred to as "modernization" -- consists of the replacement of old, traditional varieties of coffee such as *típica* or *bourbón* with newer varieties that respond well to chemical fertilizers. Another feature of the modernization process involves the elimination or reduction of shade, the goal being to open the coffee up to the sun to deter the spread of fungal diseases, and to increase coffee yields.

In many cases, shade removal and establishment of high-yielding coffee plants have not achieved the intended objectives. For example, technification has often entailed planting of *caturra*, a dwarf mutant coffee variety discovered in Brazil during the last century and brought to Central America in the 1950s, which yields about 30 percent more coffee per shrub if supplied with fertilizer inputs. Although initially touted as being resistant to coffee leaf rust, *caturra* is, in fact, susceptible to the disease.

The transformation resembles in many ways the changes that began in basic grain production throughout much of the developing world in the 1950s. The high-yielding varieties of coffee, the use of agrochemicals, and the restructuring of the production unit itself all have their parallels in the "green revolution" associated with corn, wheat and rice production in the South. For coffee, the transformation means increasing the density of coffee plants from 1100-1500 per hectare to 4000-7000 plants per hectare. These higher-yielding varieties are planted very close together and typically plied with petroleum-based fertilizers, as well as

herbicides, insecticides and fungicides. As discussed in the following section, these chemical inputs can create their own challenges, not the least of which is toxic exposure for farmworkers due to lack of information about the use and effects of chemical products or the unfeasibility of wearing protective clothing in hot weather.

The transformed coffee landscape elicits images of industrial agriculture. The neat rows of coffee beneath direct sun or scant shade resemble an English hedge-row compared to the shrubby understory of a traditional farm. Shade trees, when present in this industrial system, receive "scientific" pruning techniques that produce a thin laminar look to the canopy, thus reducing the structural diversity of what might otherwise offer an array of niches to insects, birds and other animals. Moreover, the limited shade trees sometimes retained in technified sun plantations often tend toward a single species. As discussed below, the modern coffee agroecosystem features much lower levels of structural and species diversity than the traditional coffee farm (see Box on Distinguishing Characteristics of Traditional and Intensified Coffee Production Technologies).

C. A spectrum of management types from forest to open field ([Table of Contents](#))

Conditions in the real world are more complicated than a strict dichotomy of "traditional" versus "modern" or "shade" versus "sun" coffee. Many examples of both these management systems exist across the coffee landscape of Latin America. In practice, however, they represent the extreme ends of a continuum of intensification within the coffee sector, and, as with any continuum, plenty of examples fall between the two extremes. Many issues will influence the final appearance of the coffee holding, including conditions associated with geographical setting--that is, factors such as topography, ecological zone, and rainfall. The collective knowledge of a region's coffee growers, and the social and political interactions among the producers, will also shape a particular area's general management style. Likewise, institutions can affect where along the continuum coffee holdings in a particular zone may fit (see following section). Of course, an individual grower's own assessment of how to manage a coffee farm plays a central role in the final outcome of its appearance. This often involves inter-generational communication of knowledge. Fieldwork reveals that many growers manage their holdings in a way taught them by their fathers, uncles, or grandfathers. Whatever the various factors, the reality of the coffee landscape across much of Latin America is one of diverse management styles.

One categorization of these management styles that serves as a starting point for understanding this "management spectrum" was devised years ago by some Mexican coffee researchers and technicians. It identifies five different management types, using shade levels and management as indicators for intensification. The less shade there is, the more intensified the production system. Implied in the scheme is a tendency to be more dependent upon the market, and less inclined to produce a variety of commodities for household use, as a holding is more intensified or industrialized. (See Figure 1.)

"Rustic coffee" displays the least intensified management system, which is characterized by the coffee plants being inserted into the existing forest with little or no alteration of the native, already-present vegetation. Production under these conditions is destined for the market, but little time and less capital is invested in realizing this production. The "traditional polyculture" holding mimics the rustic coffee in structure, but the species diversity can be much greater because of the deliberate planting of other plants

valuable to the household. Yields in "commercial polyculture" systems are usually higher than those found in the less-intensified holdings, but commercial polycultures also include several non-coffee products that provide food and/or income for the grower. A "reduced" or "specialized shade" system normally displays a single canopy species (e.g., genera such as *Inga*, *Erythrina*, *Gliricidia*, *Grevillea*), the maintenance of which is highly controlled, giving an overall manicured appearance. This distinctive system often has a laminar look to the shade layer, and is in effect a two- or three-species agricultural system (the coffee plus the one or two shade species). Finally, there is the "open-sun" management practice, which eliminates the overstory completely. This system resembles tightly packed hedgerows, is highly productive if given the requisite chemical inputs, and is, like the reduced shade system, oriented solely to producing coffee for the market.

D. The role of institutions ([Table of Contents](#))

The transformation of traditional coffee into a more intensive production system has a host of proponents. In Mexico, the now-defunct Instituto Mexicano del Café (INMECAFE) advocated the adoption of industrial practices during the 1970s and 1980s. Nationally, the impact of this institution's attempt to technify the coffee sector has not succeeded as other institutional forces have in other countries. Still, in areas like eastern Chiapas, the modernization program carried out by INMECAFE coincided spatially with areas of recent social upheaval.

Colombia presents a good example of the degree to which a well-organized national institution can implement a policy it deems necessary. A key institution is the Colombian National Coffee Growers' Federation, known as "FEDERACAFE." As part of a strategy to increase production and to revamp the Colombian coffee industry, FEDERACAFE advocated the technification of production. The experience of coffee growers in the community of El Palmar illustrates the organization's role in the process. Located in the southwestern Andes in Colombia's department of Valle de Cauca, growers in El Palmar received the full attention of the Federation's efforts designed to allow Colombia to take advantage of the high international coffee prices that were hiked up after the Brazilian coffee frosts of 1973 and 1975. The technification efforts included the use of the high-yielding variety *caturra*, the reduction of shade cover, and the intensification of agrochemical use. El Palmar is only one example. Whereas twenty-five years ago, the majority of Colombia's area and production was associated with traditional systems, today 755,000 hectares of the country's total 1,104,000 hectares (2,728,000 acres) of coffee (68 percent) are technified. With modern farms capable of producing more coffee per unit area, the actual production on the technified area accounts for 86 percent of Colombia's total coffee produced. In years of high international coffee prices, Colombia uses upward of 400,000 metric tons of chemical fertilizers in coffee production.

Aside from national institutions, international aid programs have also played a part in the industrial transformation of the coffee sector in northern Latin America. Most notable is the United States Agency for International Development (USAID), which, for a 15-20 year period beginning in the early to mid-1970s, instituted a series of projects aimed at increasing production for the small coffee producer in several countries of Central America and the Caribbean. USAID's strategy for bringing more capital to the rural sector has involved technology transfer to small growers. The technology being transferred has normally entailed a more industrial approach to production, including shade reduction and heavy chemical inputs. During this coffee technification period, the total cost of USAID projects in the region totaled about \$80 million. There are still USAID projects aimed at coffee growers in El Salvador, Haiti and Guatemala.

Some recent and pending USAID funding will be directed to environmentally sound coffee production via the development of market connections in some of the region's "smaller economies." This new hemispheric-scale project with \$10 million to spend on free market support mechanisms will supposedly target small coffee producers in small coffee producing countries. One of the emphases will be fostering organic coffee markets for producers in Latin America and the Caribbean. The agency's El Salvador project has a strong environmental component, with organic coffee production playing a strategic role in capturing specialized markets (see Box on Supporting Sustainable Coffee at the Local Level).

E. Redefining modern coffee production ([Table of Contents](#))

The changes occurring in coffee production technology are part and parcel of the general trend in world agriculture characterized by a progression toward evermore intensive practices. Since agriculture's beginnings, and especially since the advent of the industrial revolution, a relentless march within agriculture has continually refined, reshaped and sometimes remade farming and crop cultivation in the image of industry. Parts of the production process in a host of crops around the world have changed significantly over the past two or three centuries, giving rise to completely new cultivars, hybrid varieties, labor regimes, chemical inputs, and, ultimately, foods upon our tables.

These changes, as well as many others, increase the efficiency and volume of production, similar to parallel technological introductions in the industrial sector. They are part of a concept of "modernization" that has proceeded in agriculture without sufficient regard to environmental consequences. Topsoil loss on erosion-prone croplands, pesticide poisoning of workers and the groundwater supply, huge increases in energy costs to bring one bushel of corn to the grain exchange, and an ever-increasing number of resistant insect pests appearing on the scene are just some of the problems facing industrial agriculture at the close of the twentieth century.

For the issue at hand -- the transformation of coffee production -- perhaps our task is to redefine "modern." While modern generally refers to the latest version or method associated with some phenomenon, the concept is incomplete without a component that reflects today's environmental challenges. This implies a commitment to using and understanding the best knowledge available to get something done in such a way as to minimize the impact upon the land. There are plenty of industrialized aspects of agriculture that can be used wisely in production. At the same time, there is a mountain of information that can be gleaned from generations of producers who have made it their everyday business (indeed, their survival strategy) to produce in such a way as to minimize risk and protect the land they use.

For coffee production, there are generations of knowledge collectively housed in the cultures of northern Latin America based on lifetimes of practical applied work. The traditional coffee system and the knowledge base associated with it is a veritable library of successful cultural practices. It is these practices that should be examined and tested for their present-day applicability and compatibility with more recent techniques. Being modern, in short, should incorporate the best knowledge from whatever system -- old or new, "folk" or "scientific" -- that preserves the productive base upon which long-term production depends. Hence, a truly "modern" production system can be regarded as one that benefits the grower with sustained yields and lowered costs over the long run, while at the same time maintaining or enhancing biodiversity, as

well as protecting the land from erosion, chemical contamination, and the inhibition of natural nutrient cycling.

Decisions about what technologies are ultimately used, as well as how best to insert oneself into the increasingly complex international marketplace, must obviously be made by those producing coffee. There is an urgent need to create the conditions in which social, political and economic structures allow such decisions, and provide growers with a wide range of knowledge upon which to base these decisions.

F. Subsidies for Industrial Coffee Production During Recent Decades ([Table of Contents](#))

The United States Agency for International Development has played a pivotal role in the transformation of coffee lands in Central America and the Caribbean. More than \$80 million dollars have been directed to small producers in the region, much of it funneled through a Costa Rica-based program called Programa de Mejoramiento del Café (PROMECAFE). Begun in the 1970s, PROMECAFE has been one of the major forces in promoting the modernization of the coffee sector. Initially, the idea was to intensify production via green revolution-like strategies, as is clear from one of the USAID Regional Office on Central America and Panama (ROCAP) reports of 1981:

"Technification" refers to a combination of measures, including scientific pruning, shading, application of fertilizer, insecticides and fungicides, planting high-yielding varieties as soon as they become available, and increasing the number of plants per manzana*, so the average yields will increase from 7-10 quintales "dry bean" to 30-35 per manzana.

More recently, a project evaluation in Guatemala related: Existing coffee plantings are typically old, low-density plantings which suffer from disease and insect problems, lack proper nutrition, are unpruned and heavily shaded. These conditions and practices greatly restrict yields and reduce productivity. In order to effectively use proven production practices which consistently yield 30 or more cwt. per manzana, it is necessary to completely remove the present plantings and introduce new varieties and a technical package of inputs and procedures which farmers -- through extension, education and training -- can readily employ.

Various projects in Honduras, Guatemala, Haiti, El Salvador, and the Dominican Republic, as well as region-wide projects created a coffee intensification boom, reflected in the popularity and enthusiastic embrace given technification by many of the region's coffee researchers and extension agents. Even agricultural advisors to the Sandinista government of Nicaragua -- a government that had enacted a number of strong environmental laws -- were enamored enough with the industrialization scheme to convince their government to "renovate" much of the Carazo district in 1980. This resulted in what essentially was the deforestation of more than 10,000 manzanas.

*one manzana = 0.69 hectare

- Source: USAID documents, 1981, 1989.
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IV. ENVIRONMENTAL DIMENSIONS OF COFFEE PRODUCTION ([Table of Contents](#))

The way coffee is grown and processed has profound environmental importance both locally and internationally. This section focuses on four themes intimately related to the coffee sector: biodiversity and conservation of forest ecosystems; agro-chemical use; water pollution from coffee processing; and soil quality. Each of these factors is critical to environmental quality in northern Latin America.

A. Conservation of forest ecosystems ([Table of Contents](#))

Deforestation trends are serious throughout the coffee-producing lands of Latin America. Seven of the ten countries in the world with the highest deforestation rates are in Latin America and the Caribbean; these seven countries include Jamaica, Haiti, Costa Rica, Paraguay, Ecuador, Guatemala and Mexico. In a number of areas, tropical forest ecosystems have disappeared or are on a path to elimination in the near-term. By the late 1980s, for example, only an estimated one-fourth of the primary moist tropical forest in Colombia remained.

Remarkable biodiversity values are at stake. Latin American tropical forests are critical ecologically for purposes of protection of atmospheric dynamics, water quality, and wildlife species, as well as economically as reservoirs of germplasm with multiple applications for food, medicine, and industrial products.

The region's threatened natural heritage transcends national boundaries. For instance, neotropical migratory birds that winter in northern Latin America constitute 60 to 80 percent of the bird species that inhabit forests throughout the eastern U.S. and Canada; neotropical migrants also constitute a large fraction of bird species in the forests of the Pacific Northwest. Birds numbering in the hundreds of millions and representing more than 120 species migrate annually through or to the part of the Central American isthmus composed of Costa Rica and Panama.

Traditional, shade coffee production has been shown to be highly beneficial to biodiversity conservation in tropical forest ecosystems. In northern Latin America, traditional coffee covers very significant areas with closed canopy, agro-forestry systems with high species diversity. Smithsonian Migratory Bird Center biologists conducting research in the southern Mexican state of Chiapas discovered that traditionally-managed coffee and cacao (chocolate) plantations support at least 180 species of birds, an amount significantly greater than bird numbers found on other agricultural lands and exceeded only by undisturbed tropical forest. The attraction of industrial sun coffee for birds falls well short of that seen in traditional shade systems. For example, studies in Colombia and Mexico have identified over 90 percent fewer bird species in sun-grown plantations than in shade coffee.

Shade coffee also provides essential habitat for diverse communities of other tropical forest species. Findings by University of Michigan biologist Ivette Perfecto and colleagues from research in Costa Rica suggest that local species diversity of beetles, ants, wasps and spiders on a single tree species (*Erythrina poeppigiana*) in shade coffee plantations approximates the arthropod diversity levels on single tree species sampled in undisturbed tropical forest.

Additional recent studies on tropical forest ecology have been conducted by scientists from Mexico's National University and Chicago's Lincoln Park Zoo. These researchers' work in Veracruz, Mexico, has shown that shaded agricultural plantations, as compared to unshaded agricultural landscapes, feature richer diversity of small mammals such as opossums, squirrels and mice. Bats, important dispersers of seeds and pollinators of many tree species, as well as natural predators of insects, also show a presence in such systems. Comparing forest habitat to several agricultural lands, these same researchers found that habitats designated as "mixed plantation" (cacao, coffee, bananas, and citrus) and "coffee" (coffee with shade trees) jointly contained 74% of the species richness.

Traditional coffee is often integral to agro-forestry systems in which tree species are cultivated together with the coffee and other agricultural commodities. Where geographic and market conditions are favorable, economic returns can be achieved through sustained-yield timber production in association with coffee. For example, research in Costa Rica has shown that timber from the precious hardwood species *Cordia alliodora* can occur with no significant damage to growing coffee crops. Agro-forestry systems, including those involving coffee, have potential to enhance the economic and ecological stability of poor rural areas in northern Latin America. By providing an alternative to deforestation, traditional coffee systems constitute an important check against greenhouse gas emissions that contribute to global warming.

B. Agrochemical use in coffee ([Table of Contents](#))

Traditional shade coffee systems typically rely on much lower chemical inputs than industrial plantations. This is because planting coffee among natural vegetation, or among trees planted for shade, fruit or timber, can reduce susceptibility to pests. Moreover, because many traditional methods have been passed down to today's farmers by previous generations before synthetic pesticides and fertilizers were widely used in agriculture, a human-land use equilibrium has evolved in coffee production over time.

Intensive pesticide use within industrial coffee production often employs chemicals that present serious health and ecological concerns. Sampling of imported green coffee beans conducted by the U.S. Food and Drug Administration (FDA) in the late 1970s and early 1980s revealed frequent detections of DDT, BHC (benzene hexachloride) and other pesticides banned in the U.S. because of possible carcinogenicity or long-term persistence in the environment.

In 1983, the Natural Resources Defense Council retained the services of an outside contract laboratory to conduct independent testing on imported coffee beans. The analysis revealed multiple pesticide residues on all samples when green coffee beans were tested using detection methods many times more precise than the FDA procedures (see Table 6). The roasting process reduced detectable levels of pesticide residues on the bean samples; however, the test of one sample of the Brazilian coffee beans retained the original level of DDD (the toxic metabolite of DDT) that had been detected on the beans before roasting. It should be noted that while DDT is rarely used on coffee today, other chemicals are used to combat insect pests, weeds, and diseases.

Over the last decade, governments throughout the Western Hemisphere have taken steps to prohibit use of a number of pesticides banned in the U.S. Certain banned chemicals remain approved for agricultural use in some Latin American countries, however. For instance, a 1990 report from the General Accounting Office

found that Costa Rica continues to permit use of chlordane, a highly toxic insecticide that persists for years in the environment. Attempts to restrict U.S. exports of banned pesticides have failed in recent years; for example, "circle of poison" legislation passed by the U.S. House and Senate fell short of final enactment in the 1990 farm bill.

Under-regulated pesticide use also threatens farmers and other rural residents with exposures to toxic substances in the workplace or in water supplies. For example, serious public health and water quality impacts have been linked to pesticide use in Mexico; in one documented case in 1987, more than 200 people became sick from drinking water contaminated with agricultural pesticides and fertilizers in the western Mexican state of Jalisco.

A recent World Resources Institute (WRI) report documented extensive human exposure to pesticides in Latin America and elsewhere in the developing world; for example, studies of farmworkers and their families in Nicaragua have revealed significant decreases in the activity of cholinesterase, an enzyme vital for normal neuro-muscular functioning. The WRI report notes that "inadequate safety and hygiene practices are the norm" in developing country pesticide use.

Recently, concerns have been raised about human health and environmental impacts associated with expanded use of the highly toxic insecticide, endosulfan, in Colombia to combat a coffee insect pest known as "la broca." According to official accounts compiled by Pesticide Action Network North America (PANNA), more than 100 human poisonings and one death were attributed to endosulfan use in coffee during 1993; more than 100 poisonings and three deaths were reported in 1994. Although the Colombian health ministry took steps to ban endosulfan use in January 1995, concerns continue to be raised that this move has not been implemented fully. The Colombian Coffee Growers' Federation and the country's National Center for Coffee Research have pointed out the availability of less-toxic chemicals, as well as biological methods for coffee pest management, and have prohibited their field technicians from recommending use of extremely or highly toxic pesticides on coffee.

Farmworkers historically unaccustomed to technified coffee production systems encounter an array of chemicals that are supposed to be applied with protective gear such as masks, long-sleeved shirts, long pants and boots -- clothing that frequently goes unused in the heat and humidity of tropical environments. Recent field research by the U.S. Environmental Protection Agency (EPA) documented widespread lapses in the use of protective clothing among pesticide applicators working in the Mississippi Delta. These EPA staff findings have important implications for farmworker health and safety in technified coffee production in northern Latin America. Current pesticide regulatory systems, including in the United States, take insufficient account of the practical limitations of wearing protective gear in hot weather.

Increased nitrogen fertilizer applications have gone hand in hand with the widespread removal of shade cover from Central American coffee plantations. Heavy synthetic fertilizer inputs in coffee have contributed to nitrate contamination of drinking water aquifers in Costa Rica, with the documented groundwater pollution in some cases exceeding World Health Organization levels. In high concentrations, nitrates can cause infant methemoglobinemia ("blue-baby syndrome"), a potentially fatal condition that impedes oxygen transport in infants' bloodstreams. Other human health concerns surrounding nitrate contamination of groundwater include suspected links between nitrates and certain cancers, birth defects, hypertension, and

developmental problems in children.

C. Water pollution from coffee processing ([Table of Contents](#))

Largely irrespective of how coffee is grown, discharges from coffee *beneficios* (processing plants) represent a major source of river pollution in northern Latin America. The process of separating the commercial product (the beans) from coffee cherries generates enormous volumes of waste material in the form of pulp, residual water and parchment. For example, the Guatemala-based Instituto Centroamericano de Investigación y Tecnología Industrial estimated that over a six month period during 1988, the processing of 547,000 tons of coffee in Central America generated 1.1 million tons of pulp and polluted 110,000 cubic meters of water per day, resulting in discharges to the region's waterways equivalent to raw sewage dumping from a city of four million people.

Coffee *beneficios* exist in a wide range of sizes. In Guatemala, for instance, where a total of some 4000 processing facilities are estimated to dot the landscape, the National Association of Coffee Growers divides them into micro-facilities (those with a capacity to process 500 to 5000 pounds of harvested coffee per day), medium facilities (5000 to 50,000 pounds per day), and large (greater than 50,000 pounds per day). The 100 *beneficios* belonging to this last category (3% of all Guatemala's *beneficios*) process 60% of the coffee produced annually.

Ecological impacts result from the discharge of organic pollutants from *beneficios* to waterways, robbing aquatic plants and wildlife of essential oxygen. Costa Rican health officials have expressed concerns over harms to marine life along parts of the Pacific Coast where rivers contaminated by coffee processing wastes flow into the ocean. According to Costa Rican government estimates from the early 1980s, coffee processing residues account for two-thirds of the total biochemical oxygen demand (the principal measure of organic pollutant discharges) in the country's rivers. In 1992, Costa Rica instituted a plan to upgrade the nation's coffee processing systems, with the objective of cutting organic pollutant discharges to surface waters by 80 percent within five years.

Recent years have witnessed important progress in the development of pollution control technology in coffee processing. A small but growing number of *beneficios* are substantially reducing the volume of water used in "wet" processing of coffee; this in turn, reduces the amount of water requiring treatment before being discharged from the processing facilities. Additional environmentally sound measures include composting coffee husks mixed with farm animal manure to use as organic fertilizer on crops, as well as digesters that produce methane gas that can be used for practical applications like powering the processing plant. Success has been demonstrated with these measures in various parts of northern Latin America, including the major coffee areas of Mexico's Veracruz state. Without a concerted regional investment plan in improved technology, however, pollution prevention will remain the exception to the rule in this part of Latin America.

D. Soil quality ([Table of Contents](#))

Soil quality benefits of traditional agricultural resource management in northern Latin America have been well documented by Colorado State University geographer Gene C. Wilken in his 1987 book, *Good*

Farmers. Regarding soils, Wilken attributes the success of traditional systems to key factors such as the following:

- understanding of local resource characteristics and how they can be applied efficiently to particular soil and crop conditions to build organic matter through such practices as mulching and multiple cropping;
- careful, precise applications of inorganic nutrients to save on production costs and prevent damage to soil and water quality;
- and effective slope management techniques such as terracing that conserve moisture, control erosion and enable agricultural production in areas otherwise unsuited for farming.

Such practices are typical within shade coffee production systems, which demonstrate remarkable technical sophistication in soil management. Additional benefits derive from substantially reduced or foregone use of pesticides, whose over-application can eliminate insects and micro-organisms that play vital roles in the enhancement of soil productivity and plant nutrition.

Elimination of shade cover can cause significant impacts on various soil quality parameters. Research in Nicaragua in the late 1980s documented that, relative to traditional systems, significantly higher erosion rates occurred on renovated coffee plantations where shade had been reduced. This study also showed that shade coffee systems demonstrated higher levels of soil moisture and organic material.

Nutrient cycling also reacts to changes in the shade cover in coffee. In Costa Rica's Central Valley, where rainfall can reach up to 2.5 meters annually, the leaching of soil nutrients into the groundwater can be significant. Within these high-rainfall areas, unshaded coffee loses nearly three times more soil nitrogen than shaded plantations. In general, shade coffee systems have been shown to be more conservative recyclers of nitrogen than unshaded plantations.

V. MARKETPLACE ACTIONS FOR SUSTAINABLE COFFEE ([Table of Contents](#))

The impetus for ecologically sound coffee production in Latin America must come from the "demand side," as discriminating companies and consumers insist upon coffee that comes from growing and processing systems that protect environmental values and enhance economic conditions for farmers and rural communities. The potential is enormous given the skyrocketing international growth in demand for specialty coffee. In the U.S., which accounts for about half the global market for roasted gourmet coffee, sales of such coffee increased from approximately \$1 billion in 1990 to \$2.5 billion in 1995. The question is how continued market expansion can be harnessed to promote forest conservation, environmental quality and higher incomes for coffee growers who implement methods to protect the environment.

Coffee drinkers who are concerned about issues such as migratory bird decline, pesticide impacts, or rural poverty in developing countries need to make their views known to the supermarkets and specialty coffee outlets where they shop. Consumers should press coffee retailers to provide specific information on the environmental and social conditions under which their coffee was grown and processed. Businesses and government agencies should consider the environmental dimensions when choosing the coffees they provide to their customers or employees. Shareholders in firms dealing in coffee should urge company

managers to integrate environmental criteria into their commercial decisions.

The specialty coffee industry has yet to begin any large-scale, concerted initiative to promote environmental protection in coffee producing countries. Nevertheless, the Specialty Coffee Association of America recently established an Environmental Policy Task Force to address ecological issues associated with coffee. The International Coffee Organization (ICO), the principal coffee trade group worldwide, held a seminar on "Coffee and the Environment" in May 1996 at the ICO's headquarters in London. A number of specialty coffee firms will be participating in the First Sustainable Coffee Congress on September 16-18, 1996, in Washington, D.C., which is being hosted and organized by the Smithsonian Migratory Bird Center.

Environmentally conscious consumers should use the power of their purchasing decisions to support coffees that are certified organic, marketed through alternative trade or social justice channels, or backed by environmental criteria such as forest conservation or water pollution prevention. These three categories vary in areas of emphasis, but share a common thread of environmental protection.

A. Certified organic coffee ([Table of Contents](#))

At present, organic coffee accounts for just one or two percent of the \$5 billion worldwide market for specialty coffee. However, organic coffee currently exhibits the fastest growth among gourmet coffee types. In addition to exports, significant growth potential exists in coffee producing countries where gourmet coffee is just beginning to emerge in domestic markets. For example, coffee co-ops from Chiapas, Mexico, have recently established retail outlets in Mexico City to sell their organically-grown "La Selva" coffee (see illustration, "Amantes del Buen Café").

Production of certified organic coffee has expanded recently in northern Latin America. Such production can be found in all countries throughout the region (see box on Supporting Sustainable Coffee). One example is Indígenas de la Sierra Madre (ISMAM), which is made up of 1,200 small-scale "campesino" coffee growers in Chiapas, Mexico. The ISMAM co-op exported 20,000 sacks of gourmet organic coffee in 1995 directly to Europe, the United States and Japan. Within Latin America, Peru outstrips other countries in terms of area, with nearly 44,000 hectares under certified production. Mexico, which produces nearly as much organic coffee as Peru, does so on just under 26,000 hectares. Other countries with land devoted to certified organic coffee include Guatemala (more than 7000 hectares), El Salvador (4900 hectares), Nicaragua(1400 hectares), and Costa Rica (550 hectares).

Certified organic coffee fetches significant price premiums on the order of 10 to 15 percent above gourmet coffee without the organic trademark. The price premium often translates into substantially higher returns for coffee growers, although the net benefits of moving to certified organic production can vary substantially from producer to producer, depending on added production costs and other variables. Organic coffee co-ops pay thousands of dollars each year to cover certification costs such as the time and travel expenses of field inspectors. The downside to organic certification from many growers' perspective is the cost of periodic inspection. For the multitude of small coffee growers who are *de facto* or "passively" organic producers because they cannot afford to use agrochemicals, inspection costs can present a formidable obstacle to certification, and hence to the premium price they might otherwise obtain for their coffee.

Organic coffee growers are typically organized into local cooperatives that are affiliated with, and bound by the standards of, international certification programs. The largest of such programs is Organic Crop Improvement Association International (OCIA), which as of late 1995 claimed more than one million certified hectares (2.5 million acres) and 30,000 grower-members worldwide. Other programs certifying organic coffee in northern Latin America include the European-based Naturland and Demeter.

The international certification programs serve several functions. For example, OCIA sponsors crop improvement seminars and other technical assistance for farmers implementing organic systems; independent third-party inspection of certified farms, with an audit trail to track coffee and other commodities from consumers to producers; and a trademark that appears as a label on OCIA-certified coffee and other organic products.

Sound environmental stewardship is a central tenet of the organic agriculture movement. For example, soil building practices are key OCIA requirements for certified organic farms. The OCIA standards permit certification only of fields or farms where no synthetic pesticides or fertilizers have been applied during the preceding three years.

Diversified forest cover appears to be one common approach by which organic coffee farmers achieve certification standards for soil quality and chemical use. For example, organic coffee growers in Mexico maintain diverse shade cover to enhance soil fertility and to reduce their production systems' vulnerability to pests. OCIA currently encourages its coffee producing members to diversify the shade cover, so that growers can benefit from a variety of products associated with their holdings. However, existing organic standards do not contain explicit, measurable criteria for diversified shade cover.

The soil building techniques used in organic coffee farms often help reduce the waste stream of pollutants to water supplies. The Asociación de Caficultores Orgánicos de Colombia, a co-op in the process of obtaining OCIA certification, composts all organic waste from coffee processing to create a rich mulch for use as a natural source of nutrients for coffee plants. Nevertheless, measurable pollution prevention standards are not part of existing organic certification regimes.

Some Companies Dealing in Organic Coffee [\(Table of Contents\)](#)

- Adam's Organic Coffees: (415) 864-3830
- Allegro Coffee: (800) 666-4869
- Aztec Harvests: (800) 639-2378
- Cafe Altura: (805) 933-3027
- Elan International: (619) 239-8383
- Royal Blue Organics: (800) 392-0117
- Equal Exchange: (617) 830-0303
- Frontier Coffee: (319) 227-7996
- Harbor House Coffee: (800) 541-4699
- Thanksgiving Coffee: (800) 648-6491

InterNatural Foods: (201) 909-0808
Montana Coffee Traders (800) 345-5282
Nature's Finest: (800) 237-5205
Organic Coffee Co.: (800) 758-5282
Sustainable Harvest: (510) 654-2735

- Source: [The Green Guide](#), newsletter of
- Mothers and Others for a Livable Planet, Feb. 7, 1996; other sources.

B. The alternative trade and social justice market ([Table of Contents](#))

Coffee producers in certain countries enjoy premium prices for their coffee due to the connections they have forged during the last decade with groups that make up what is known variously as the "solidarity," "social justice," "alternative trade," or "fair trade" movement. The movement is based on the idea that producers of traded commodities in developing countries are capable of achieving economic success provided they receive fair prices in international markets for what they produce. Recent years have seen a growth of the movement, with trade unions, church groups, and women's organizations becoming involved. Throughout Europe, for example, fair trade coffee accounts for 11,000 metric tons of traded coffee annually, finding outlets in some 35,000 supermarkets.

Like coffee that is certified organic, coffee distributed through alternative trade channels currently represents a very small fraction of the worldwide specialty coffee market. Sales have increased, however, as more and more coffee drinkers have learned about the poverty and dismal working conditions characterizing small coffee producers' lives. Global sales of coffee in the social justice market amounted to \$400 million in 1995, according to estimates from the International Federation of Alternative Trade (IFAT), an association that oversees 36 alternative trade organizations worldwide through a code of ethics established in 1990 and updated in 1995.

The social justice market is organized around the International Coffee Register, which is essentially a company owned by the fair trade groups Max Havelaar, TransFair, and the Fair Trade Foundation. A total of 286 coffee-producing cooperatives are members of the Register, representing about half a million growers around the world. Under current arrangements, grower groups are guaranteed \$1.26 per pound for "green" (ready-to-roast) coffee. If world prices average above this figure, producers receive five cents per pound above the world price.

There are currently about 15 licensed importers of fair trade coffee. If a producer cooperative needs a cash advance to use for purposes of extending credit to individual growers, or for other expenditures, it falls to the importers to provide advanced funding that can total up to 60 percent of the contracted coffee with that cooperative, at rates of interest negotiated between the importer and the coffee cooperative.

The social justice movement and its corresponding market are much more developed in Europe, where they originated, than they are in the United States and Canada. European solidarity groups have long been active in Latin America, with institutional support available to them through social democrat governments and a solid base of non-governmental organizations. Community development projects funded by the private

sector or via government funds have long been a hallmark of development work conducted by countries like Belgium, the Netherlands, Germany, France and Great Britain.

In 1988, Max Havelaar Netherlands developed a market label to link small coffee growers in Mexico directly to international markets. The label propelled the Dutch "alternative" trade in coffee from a mere 0.3 percent of national consumption to 2.3 percent by 1995. In Switzerland, it has captured 5 percent of the market. The Max Havelaar label now has a presence in at least six European countries, including its home country, Belgium, Austria, Germany, France and Switzerland. Another social justice label, TransFair, exists in eight nations around the globe, including Canada, Japan, the US, Italy, Germany and Austria.

An innovative direct marketing strategy has been employed by Aztec Harvest Coffee Company, which is owned by Mexican small-farmer cooperatives and is structured to bypass intermediaries (and thus maximize growers' profits) in selling coffee to US and European buyers. Substantial portions of the coffee traded through Aztec Harvest come from certified organic co-ops. Well-known Aztec Harvest customers have included Ben & Jerry's and United Airlines.

Although focused primarily on social justice for small coffee growers, the alternative trade movement has incorporated environmental objectives in a general way. For example, criteria for the International Fair Trade Coffee Producers' Register (overseen by Max Havelaar Netherlands in conjunction with other Max Havelaar and TransFair groups) specifies that any producer organization wanting to participate must be committed to "sustainable development strategies, applying production techniques which respect specific ecosystems and contribute to the conservation and a sustainable use of natural resources, in order to avoid as much as possible -- or even totally -- the use of chemical inputs."

Moreover, the IFAT's Code of Ethics spells out environmental expectations for the participation of alternative trading organizations (ATOs). The two-point environmental section of the code states:

- a) It is also the aim of ATOs to encourage the production of goods by means which preserve the environment and conserve scarce resources and in ways which cherish the skills and develop the capacities of the producers and do not harm their health. This applies equally in the First World as in the Third World.
- b) ATOs are committed to encouraging development which is sustainable and responsible in terms of the long term survival of the human species and of the natural world.

In many cases, strong overlap exists between the certified organic and social justice coffee movements. The Massachusetts-based Equal Exchange works primarily to ensure fair prices to small growers, and deals mostly in certified organic coffees. In other cases, the fair trade market makes linkages with small peasant producers who, because of their inability or unwillingness to use costly chemical inputs, produce what can be regarded as a "passively" organic or "organic by default" coffee.

C. Further integration of environmental criteria in consumers' coffee choices [\(Table of Contents\)](#)

There are many good reasons to buy certified organic or social justice coffee. There is also a need to develop and apply a broader range of environmental criteria than may be covered by existing certification

regimes. For example, explicit criteria for coffee produced through "shade-grown" or "bird friendly®" management systems could provide a powerful market force for forest conservation and sustainable economic development in northern Latin America and other coffee producing regions. Additional criteria are needed to reflect whether pollution prevention measures have been applied in coffee processing.

To ensure consumer confidence, any new environmental criteria for coffee must be measurable, scientifically rigorous and consistent. The criteria should not be one-dimensional, but rather should reflect the complexity of coffee management systems and the biodiversity values of various levels and composition of shade cover. Additionally, the criteria should be evolutionary, that is, subject to refinement in the face of improved scientific understanding or technological innovations.

Environmental criteria might find expression in the marketplace in a number of ways. Adding or overlaying new environmental metrics within existing certified organic or alternative trade systems is one possibility. Another is a separate certification regime such as the Rainforest Alliance's "ECO-O.K." Program, which is moving toward certifying coffee with criteria developed by Fundación Interamericana para Investigaciones Tropicales, a Guatemalan NGO. Draft criteria for the "ECO-O.K." effort on coffee include maintenance of a minimum number of shade trees per hectare and encouragement to growers to minimize agrochemical applications. The use of native perennials as shade, as well as the maintenance of vegetation buffer zones next to rivers, streams, and lakes constitute other criteria stipulated for "ECO-O.K." certification.

One option worth serious consideration is a system that, as distinct from dichotomous certification regimes (where products are either certified or not), rates coffees according to their performance on a range of environmental parameters. Hypothetically, for example, a scoring method might be devised where a coffee receives "one star" if grown under shade cover with limited diversity, or "two stars" if the shade cover features a highly diverse plant community and forest canopy structure. Similar gradations could be developed to reflect varying degrees of pollution prevention and waste recycling in coffee processing.

These options are not necessarily mutually exclusive. However, any further integration of environmental criteria into coffee markets must proceed in a way that informs rather than confuses consumers. Moreover, such integration must ultimately satisfy coffee roasters' primary interest in product quality and competitive prices. It would be unrealistic to assume that new environmental criteria, no matter how compelling, will be sufficient to "pull" particular coffees through the market irrespective of price and quality considerations.

VI. POLICY SUPPORT GOVERNMENTS AND INTERNATIONAL INSTITUTIONS ([Table of Contents](#))

People throughout the Western Hemisphere have much to gain from ecologically sound coffee production. Governments and international institutions should thus mobilize their efforts to support traditional coffee farmers whose agricultural practices preserve biodiversity and enhance soil quality in Latin America. Individuals and institutions should likewise direct their efforts into boosting methods of coffee processing that substantially reduce solid and liquid waste dumping into water supplies.

Local governments, bilateral funders, and multilateral institutions should find ample reason to target environmentally sensitive coffee production and processing as acceptable funding opportunities.

Establishing policies that preserve shade coffee production and allow small coffee growers to benefit from the good land stewardship practices that many already have in operation not only will help maintain the biodiversity associated with shade coffee, but will bring greater economic benefits to the coffee communities involved. Moreover, ecologically sound shade coffee production falls squarely within the realm of carbon sequestration, and producers could potentially fit within programs such as the United States Joint Implementation Initiative.

A priority will be to provide financial incentives, credit, and technical assistance for coffee growers and processors to adopt methods that maintain crop yields and profits while benefiting environmental values. Agriculture, tax and trade policies should be reformed to encourage, rather than create barriers to, environmentally sensitive coffee production. Support is also needed for expanded research on the ecology and economics of coffee production and markets in the Americas.

A. Funding incentives for environmentally sound coffee production ([Table of Contents](#))

Adoption of sustainable coffee systems presents transitional economic risks for growers and processors. Targeted incentives are needed to enable more small-scale coffee growers in Latin America to maintain or implement environmentally sound management practices that help sustain long-term productivity and profitability. Sustainable development in the Latin American coffee sector should be a priority for bilateral economic assistance, the Global Environment Facility, multilateral development banks, and national environmental funds.

1. Bilateral assistance ([Table of Contents](#))

Through its various programs for bilateral foreign assistance, the United States should support sustainable coffee production in Latin America. Recent examples from the Inter-American Foundation and the U.S. Agency for International Development illustrate the potential for bilateral funding to improve economic and environmental conditions for coffee producers (see Box on "Supporting Sustainable Coffee at the Local Level"). The need for incentives connected to environmentally sensitive coffee argues strongly for increased bilateral assistance for sustainable development in developing countries. Unfortunately, current political trends in the US are toward sharp reductions in foreign assistance funding.

The role of NGOs operating internationally will become increasingly important in providing financial and technical assistance for environmentally sound coffee production. For instance, Conservation International is developing a multi-faceted program to work with local farmer organizations in priority biodiversity areas in Latin America and worldwide. The program will be designed to provide pre-harvest financing to enable growers to store their coffee until they can obtain a favorable price from buyers, technical support in environmentally sound production methods, and transitional costs for implementing positive land stewardship practices. In Mexico, the Coordinadora de Pequeños Productores del Café de Chiapas (COOPCAFE) is undertaking a program under a grant from the John D. and Catherine T. MacArthur Foundation to train peasant farmers in that state in organic coffee production and to support ecologically sound agriculture by farmers operating in the buffer zone of the Lacandon rain forest.

2. Global Environment Facility ([Table of Contents](#))

The Global Environment Facility (GEF) is the world's only multilateral dedicated fund for the environment, providing grants to developing countries to protect global resources. The GEF is governed by an independent Council, and the projects it funds are implemented by the World Bank, United Nations Development Program (UNDP) and United Nations Environment Program (UNEP).

The GEF was launched in 1991 as a pilot program. In 1994, the Facility completed a restructuring process that reflected many recommendations by conservation groups and governments, as well as an independent evaluation of the pilot phase. Total funding for the GEF over the next three years is set at \$2 billion -- an amount to be contributed in annual installments by 26 nations. The U.S.-agreed share of the GEF replenishment is \$430 million, of which Congress appropriated \$90 million for fiscal year 1995, but just \$35 million for fiscal year 1996.

The GEF's purpose is to address environmental problems that are "global" in nature. Hence, GEF-funded projects must fit within one or more of the Facility's focal areas of biological diversity, climate change, international waters, ozone depletion, and land degradation.

Environmentally sound coffee production should fall squarely within the GEF guidelines, in the biodiversity area and perhaps others. In its discussion of forest ecosystems, the operational strategy recently approved by the GEF states that priority will be given to "conservation of areas of importance for migratory species." The strategy's list of activities for sustainable use of biodiversity includes "[P]romotion of sustainable production and use of natural products, such as nontimber forest products. . .and agrobiodiversity-related products, including the development and implementation of sustainable harvesting and marketing regimes." These and other passages in the document are directly relevant to coffee production in northern Latin America.

Global Environment Facility grants are available not only to national governments, but also to non-governmental organizations and private sector businesses. A small fraction of GEF funds are allocated through a UNDP-administered Small Grants Program for projects conducted by non-governmental organizations and local communities. Conservation groups have urged enlargement of the existing Small Grants Program, as well as establishment of a Medium Grants Program for NGO projects whose scale falls between the small grants program and the regular GEF funding available to governments. The small and medium grants approach would be well-suited to funding local environmentally sensitive coffee enterprises in Latin America.

Another potential funding window for ecologically sound coffee is a newly proposed "Biodiversity Enterprise Fund for Latin America," to be directed by the International Finance Corporation (IFC) with partial support from the Global Environment Facility. Affiliated with the World Bank, the IFC is the largest multilateral source of private sector financing in developing countries.

Supporting Sustainable Coffee at the Local Level:

Two Examples

Addressing Economic and Environmental Needs in Southern Mexico

The U.S. government established the Inter-American Foundation in 1969 to provide direct financial support for self-help efforts initiated by poor people in Latin America and the Caribbean. Funded primarily by Congressional appropriations, the Foundation awards approximately 200 grants per year.

The Inter-American Foundation made a grant in 1992 to the Unión de Ejidos de La Selva (La Selva), an organization of small-scale agricultural enterprises in the southern Mexican state of Chiapas. The grant was made in support of La Selva's program for producing and marketing organic coffee. The John D. and Catherine T. MacArthur Foundation provided additional support to La Selva for development of a coffee quality control program.

The program was designed to expand the acreage devoted to active organic farming through the delivery of cost-effective agricultural extension services to farmers. Beneficiaries receive practical advice from other local farmers on management issues such as terracing of hillslopes, composting of organic matter, pruning of coffee plants, inter-cropping techniques to diversify the agricultural landscape and the mix of marketable products, and the process of obtaining the necessary certification that enables coffee to be labeled as "organic."

Among the program's main results has been to increase the attractiveness for local coffee growers to take risks associated with making the transition to conservation-based organic production. Participating farmers have benefited from new-found access to international niche markets for high quality organic coffee. Moreover, expanded production of organic, shade-grown coffee has provided an ecologically sound alternative to tropical forest destruction in an area of Mexico's Lacandón rainforest neighboring the Montes Azules Biosphere Reserve. The program has provided a successful model with significant potential for replication elsewhere in the region.

Infrastructure for Sustainable Coffee in El Salvador

A recent project sponsored by the U.S. Agency for International Development has helped the La Providencia Cooperative in El Salvador tap into organic coffee markets in the U.S., Canada, Germany and Japan. A USAID-funded non-governmental organization known as the Cooperative League of the United States (CLUSA) has assisted members of the Salvadoran co-op in their adoption of soil and water conservation practices, implementation of composting methods that provide natural fertilizer for coffee plants, and certification of their product by the internationally-recognized Organic Crop Improvement Association. The organic coffee known as "Pipil" recently won El Salvador's national environmental award, and CLUSA is being approached by additional producers interested in raising organic coffee.

Installation of power through USAID's rural electrification program has provided additional assistance to La Providencia's organic coffee venture. The La Providencia project represents a welcome departure from USAID's previous emphasis on funding coffee technification in northern Latin America and the Caribbean.

Sources: Ellen Contreras Murphy, "La Selva and the Magnetic Pull of Markets: Organic Coffee-Growing in

Mexico," 19 Grassroots Development (Journal of the Inter-American Foundation, 1995), 27-34; "New Organic Coffee Gets Salvadoran Economy Brewing," 1 USAID Developments (USAID, Summer 1995), 4; personal communication with Stanley Kuehn, Director of the CLUSA project in El Salvador, October 1995.

Preliminary documents describing the Biodiversity Enterprise Fund for Latin America suggest there may be significant potential for financing of coffee operations that protect ecological values. The project proposal submitted to the GEF notes specifically that "fast growing markets for biodiversity-linked products" are creating new opportunities for projects that advance both conservation and development objectives. The IFC's draft feasibility study for the project states that, among its priorities, the fund will support investments in "alternative, certified organic, or biologically diverse agricultural methods."

3. Multilateral Development Banks ([Table of Contents](#))

Within their Western Hemisphere lending, the World Bank and Inter-American Development Bank (IDB) appear to be increasing their programmatic emphasis on biodiversity and other environmental objectives. The 1987-1993 World Bank portfolio contains numerous projects involving agriculture and forest management in Latin America and the Caribbean. The IDB's draft plan for implementing the Action Plan from the 1994 Summit of the Americas states that the Bank will "make biodiversity concerns an integral element of rural development initiatives."

Support for sustainable coffee production should be a priority for multilateral development bank programs in Latin America. World Bank and IDB loans for forestry and agriculture projects in the region should be assessed for potential impacts on small-scale, traditional coffee growers and local communities. The Banks could play a particularly important role in addressing funding needs for projects requiring significant capital investment, such as pollution prevention technology in coffee processing facilities. For example, water use reduction and recycling are part of an IDB-funded project being implemented by small-scale grower cooperatives in El Salvador in partnership with Appropriate Technology International.

The World Bank is currently developing a \$200 million Agriculture Development and Rural Poverty project for Mexico. Slated for approval in mid-1996, the project targets the extremely poor rural areas in Mexico's southern states that encompass much of the country's coffee-growing lands. If properly designed and implemented, the project could benefit sustainable, shade-grown coffee enterprises. The Bank's public information document describing the project observes that "government price and trade policy for agriculture has favored larger commercial farmers. . .as well as commercial livestock producers" and, moreover, that "[D]uring the past six years, government agricultural programs aimed at poor producers have diminished in scope and in effectiveness."

The project's defined objective is to promote long-term sustainability for poor, small-scale farmers and rural organizations through measures such as soil and water conservation, and improved processing and marketing of agricultural commodities. Examples of possible areas for project financing include on-farm investments in sustainable natural resource management, applied research and agricultural extension, and assistance to producer organizations to improve their capacity for marketing, access to credit and adoption of sustainable production technologies.

Two additional funding institutions, created under the environmental agreements accompanying the North American Free Trade Agreement (NAFTA) among Mexico, Canada, and the United States, have potential to fund sustainable coffee production in Mexico. One is the North American Development Bank (NADBank), whose estimated \$7-8 billion in total financing capability over the next decade will be directed toward funding public works projects for sewage treatment, solid waste management and other environmental infrastructure projects needed in the U.S.-Mexico border region. The Bank nevertheless features a "Community Adjustment and Investment Program" under which 10 percent of the NADBank capital is supposed to go toward grants and loans to communities throughout Mexico and the U.S. affected by economic integration. Support for communities in southern Mexico engaged in environmentally sound coffee production should receive priority attention within implementation of the NADBank's community adjustment window.

The other institution of concern is the Commission for Environmental Cooperation (CEC). At the October 1995 meeting of the CEC Council, the environmental ministers from the three countries jointly announced creation of a \$2 million North American Environment Fund. Grants from the fund will support local community organizations "for projects that promote an integrated approach to ecosystem management and the sustainable use of natural resources important to the region as a whole." Use of the fund to support sustainable, shade-grown coffee would fit well with the Commission's current priority focus on protection of migratory bird habitat.

4. National environmental funds ([Table of Contents](#))

An additional funding source for ecologically sensitive coffee production may be found in national environmental funds, which comprise various mechanisms such as trust funds, foundations and endowments that provide financial support for activities that benefit biodiversity conservation and other environmental purposes. Such funds are typically governed by Boards of Directors with governmental and non-governmental representatives, are able to receive and manage money from a variety of sources, and can disburse grants to non-governmental organizations and community groups.

National environmental funds have demonstrated considerable promise in financing local conservation and sustainable development projects, building NGO capacity, and strengthening democracy and the role of civil society in conservation policy choices. The role of national environmental funds becomes even more compelling in the face of cutbacks in U.S. bilateral and multilateral assistance for sustainable development in developing countries.

Recent years have witnessed a rapid and diverse proliferation of national environmental funds in Latin America. One example is ECOFONDO, which is a private trust fund established in 1993 and managed jointly by the Colombian government and the NGO community. Major funding sources for ECOFONDO have included forgiveness of official USAID debt through the Enterprise for the Americas Initiative, and a subsequent grant from the government of Canada. Environmentally sound coffee production certainly falls within several categories of activities eligible for ECOFONDO grants, such as "sustainable development of watersheds," and "conservation and sustainable management of ecologically important areas."

B. Reform of agriculture and tax policies ([Table of Contents](#))

It is essential that national farm policies -- through whatever mix of price and income support, commodity supply management, credit assistance, research, extension, conservation cost-sharing or other instruments they may employ -- be structured to encourage rather than penalize traditional coffee producers who practice good land stewardship. Government intervention, for example, should be targeted to boost the productivity of under-managed, "passively" organic coffee farms that, for reasons of poverty and/or neglect, have not attained adequate yields. Another priority is to ensure that small-scale coffee growers have access to adequate credit to enable them to implement environmentally sensitive practices and obtain good prices for their coffee.

Unfortunately, agricultural policy frameworks in Latin America have done little to provide incentives for sustainable coffee producers. It has instead been more common for commodity subsidies and related programs to reward large-scale operations and create bias against small-scale, diversified farming systems.

Mexico is a case in point. Until the early 1990s, Mexico subsidized livestock heavily through artificially low feed prices; this created implicit taxation of shade coffee crops and encouraged conversion of forests to pasture. Notwithstanding benefits delivered to some small producers, the National Solidarity Program implemented under the Salinas administration has been criticized for not addressing underlying problems facing the Mexican coffee sector such as the untenable debt loads of many small growers. Recent social unrest in southern Mexican states such as Chiapas and Guerro, has been attributable, at least in part, to the long-standing failure of government policies to address the extreme poverty among coffee growers.

As noted above, during the 1970s and 1980s, the Mexican government's Instituto Mexicano del Café (INMECAFE) promoted intensified coffee production through the reduction or removal of diverse shade cover, planting of high-yielding hybrid coffee varieties, and increased agrochemical inputs. Privatization of INMECAFE went forward in the late 1980s and early 1990s without effective safeguards against small farmer dislocation. In a move that seems reminiscent of the production-oriented policies of the 1970s and 1980s, the Mexican government recently announced an ambitious proposal to provide coffee plants, credit and technical assistance to growers wishing to renovate their operations in search of higher yields. As part of a larger production-oriented program known as "Alianza Para El Campo" ("Countryside Alliance"), planners believe this new policy can position Mexico's total coffee output ahead of Colombia's within the next decade. Experts have criticized this initiative, among other reasons, for ignoring its negative environmental implications.

Since 1993, Mexico has been instituting a package of agricultural reforms known as PROCAMPO (Programa de Apoyos Directos al Campo, or "Program of Director Support to the Countryside"), designed to replace commodity price supports with fixed income support payments made directly to farmers over the next 10 years, and phased out over the subsequent five years. In one change that could conceivably benefit the competitive position of organic coffee growers, the PROCAMPO reforms remove most subsidies for inputs such as purchased chemical pesticides.

The overall impact of PROCAMPO on the environmental practices of coffee producers is not immediately clear because the program is so new and its early implementation has been complicated by the Mexican economic crisis following the December 1994 peso devaluation. Changes announced by a Mexican inter-

governmental commission in October 1995 will broaden the scope of PROCAMPO to include greater emphasis on technical assistance, decentralization of decision-making authority to the state and local levels, and a new program called "PRODUCE" under which the government will pay up to 50 percent of certain costs incurred by the poorest farmers.

Because its benefits are not linked to production of specific commodities, PROCAMPO is expected to reduce incentives for surplus production of major crops such as corn, soybeans and sorghum. This represents a shift away from certain previous policies that, as noted above, have favored large-scale grain producers and commercial livestock operations at the expense of forest conservation and diversified farming systems including coffee. On the other hand, some non-governmental organizations and community forestry associations in Mexico have expressed concern that PROCAMPO encourages conversion of land to production of agricultural commodities as opposed to sustainable forestry enterprises.

Reforms to change the incentive structure for coffee producers will not be complete without a review of tax policies. This examination should focus on removing perverse tax preferences that favor unsustainable farming methods, as well as on providing tax benefits to encourage development of sustainable land use and resource management.

One promising strategy would be the creation of sustainable agriculture funds through taxes on pesticides. Such revenues could be channeled into national environmental funds, as mentioned above. This would be a means of "internalizing" the costs to environmental quality and human health that result from chemical-intensive sun coffee production. Useful precedents for taxing agricultural chemicals exist in several European countries, as well as in states such as California and Iowa.

A related approach is to recapture a portion of revenues associated with international coffee trade, to be directed toward social and environmental purposes. For example, Colombia has used savings from the 1990 elimination of the European Community's four percent tariff on coffee imports to establish an Ecological Fund for Coffee Zones. Interest from the investments of these revenues now supports projects focusing on the integrated management of watersheds, the recycling, composting, and management of municipal garbage, water treatment, and community development via environmental education programs. The Fund, overseen by the Federación Nacional de Cafeteros de Colombia, is administered in Bogotá, with each coffee department receiving funds proportional to its coffee production.

Finally, agricultural and tax policy reforms should be accompanied by measures to strengthen regulation and monitoring of pesticides. Tighter restrictions are needed on exports of banned pesticides, in addition to upgrading of domestic regulatory regimes. Another priority for countries throughout the Americas is to implement "right-to-know" requirements that assure provision of reliable pesticide use information to farmworkers, regulators and the public.

C. Research ([Table of Contents](#))

Scientific evidence now available makes a compelling case documenting the environmental damages of industrial coffee production, and the corresponding environmental advantages of traditional methods. The various studies conducted to date provide a strong basis to move forward, without delay, to mobilize market

and policy forces on behalf of sustainable coffee systems.

A coffee strategy to promote environmental protection and sustainable development in northern Latin America, however, will require a commitment to expanded research. This commitment is needed to improve our understanding of the complex agro-ecology and economics of coffee, and thus to give needed direction to choices made in policy, funding and markets. The research strategy should be geared toward providing practical information to coffee growers on how they can implement environmentally sound production systems, and achieve success in domestic and international markets.

The following are examples of priorities for additional research on environmentally sensitive coffee:

- a) mapping of Latin American countries to determine the current spatial distribution of traditional, shaded, biodiverse coffee lands;
- b) research on the tree species known to be associated with greater biodiversity of birds, insects, etc.;
- c) studies to determine the appropriate levels of thinning or pruning of the overstory trees that will maximize associated biodiversity and coffee production;
- d) the role of physiological characteristics of shade species, such as flowering and fruiting patterns, to determine what mix of shade best enhances biodiversity levels;
- e) studies comparing the performance of shade and sun coffee on environmental parameters such as migratory species, biological diversity, soil productivity and water pollution;
- f) market analysis for environmentally sound coffee and the non-coffee products raised on coffee farms;
- g) economic studies to measure the external costs of coffee production, and to describe options for internalizing those costs; and
- h) studies comparing the economics of environmentally sound versus conventional production systems at the farm level.

Research strategies in these and related areas will necessarily include documentation of traditional knowledge by working with local people and communities; development of incentives for case studies on working farms and farmer-to-farmer information exchanges; increased support for research and monitoring activities over long time horizons; and establishment of regional networks of researchers and data bases for biogeographical and market information.

D. International coffee agreements ([Table of Contents](#))

International coffee markets are subject to wide fluctuations, in general adhering to supply and demand relationships. Major swings in coffee prices may go largely unnoticed by consumers in wealthy industrial

countries, but are critical to individual coffee growers and national economies throughout much of Latin America. When coffee prices drop precipitously, the impacts fall hardest on low-income farmers and laborers. The consequences are frequently acute for small-scale growers practicing environmentally sound coffee production.

Since the early 1960s, a series of international agreements have failed to achieve long-term solutions to price instability in the coffee sector. Unemployment and financial impoverishment resulting from the collapse of the International Coffee Agreement in 1989 affected millions of farmers and farm workers in the coffee growing countries of Latin America. Prices have risen dramatically since the 1993 Coffee Retention Plan, which is an accord among 28 coffee producing countries from Latin America, Asia and Africa that seeks to restrict international market supplies by requiring members to withhold 20 percent of coffee stocks from exportation. However, much of the recent boost in prices is attributable to a mid-1994 freeze that destroyed a large portion of the Brazilian coffee crop. It is too early to assess whether the 1993 scheme will lead to more enduring coffee price stabilization than the previous international agreements.

The world's trading partners have taken initial steps toward integrating environmental concerns into the International Coffee Agreement. Article 35 of the 1994 version of the Agreement requires members to: [g]ive due consideration to the sustainable management of coffee resources and processing, bearing in mind the principles and objectives on sustainable development agreed at the Eighth Session of the United Nations Conference on Trade and Development and the United Nations Conference on Environment and Development.

Agenda 21, the comprehensive action plan adopted at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro (the "Earth Summit"), contains abundant provisions that apply to ecologically sound coffee. Examples include commitments aimed at "international cooperation to accelerate sustainable development in developing countries," "combating deforestation," and "meeting agricultural needs without destroying the land."

Future coffee trade negotiations should better serve the interests of sustainable coffee producers, with the goal of ensuring prices that enable a reasonable return on sales and that reflect costs incurred in making production systems environmentally sound. Toward this end, for example, international agreements should never undercut the ability of producers to bypass the "middle man" in international commodity markets, and to sell their products directly to roasters and consumers wishing to purchase coffee that is grown and processed without environmental degradation.

One option for future reform of coffee trade regimes is to promote agricultural shifts from sun-grown coffee into environmentally sound alternative crops. In addition to reversing the environmental damages from industrial coffee plantations, such shifts could help reduce surplus coffee volumes and thus contribute to more lasting price stability for sustainable coffee producers. Precedent for this approach might be found in the "Diversification Fund" contained in the 1968 version of the International Coffee Agreement. This fund required contributions from signatory countries to be used for the purpose of developing alternative crops and economic enterprises in coffee exporting countries. Reinstatement of a diversification fund or similar instrument should be carefully structured to promote shifts away from unsustainable sun-grown coffee and into crops that reduce chemical inputs and conserve natural resources.

VII. TABLES ([Table of Contents](#))

Table 1: Coffee Area as a Function of Technology Level in Selected Countries of Northern Latin America (thousands of hectares)

Country	<u>Technology Level</u>			Total Coffee Area	Percent Technified
	Traditional	Intermediate	Technified		
Mexico	64.9	489.7	114.4	669.0	17
Costa Rica	10.8	54.0	43.2	108.0	40
El Salvador	152.4	0.0*	13.2	165.6	8
Guatemala	110.1	85.6	49.3	245.0	20
Honduras	30.0	100.0	70.0	200.0	35
Nicaragua	53.0	14.0	27.1	94.1	29
Dom. Rep.	77.2	0.0*	25.8	103.0	25
Haiti	30.6	0.0*	3.4	34.0	10
Colombia	357.3	n/s	791.9	1149.2	69
Total	886.3	743.3	1138.3	2767.9	41.1†

*figures are probably greater than 0.0; no reliable data on intermediate technology level available

†average for region, calculated from regional totals; average of countries' technified area is 28.1%

n/s=information not supplied

Sources: Mexico-FAO Production Yearbook (1991) and Nolasco (1985); Costa Rica-correspondence with Instituto del Café de Costa Rica (1993); El Salvador-correspondence with Patricia Valdivieso of the Consejo Salvadoreño del Café (1993); Honduras-correspondence with Fundación Banhcafé (1993); Guatemala-correspondence with Anacafé (1993); Nicaragua-Gariazzo (1984); Dominican Republic-personal communication with World Bank economist/coffee expert Panos Verangis (1993); Haiti-estimated from information from USAID (1990); Colombia-Federación Nacional de Cafeteros de Colombia (1993)

Table 2: Coffee Production Since 1950 in Northern Latin America (thousands of metric tons)

	1950*	1960_	1970†	1980	1990	% Change 1950-1990
World Total	2222	4268	4262	5039	6282	183%
Mexico	63	157	182	228	440	598
Central America	189	341	428	605	680	260
Costa Rica	23	59	82	106	151	557
El Salvador	74	114	139	183	156	111
Guatemala	57	108	125	179	202	254
Honduras	13	28	39	71	118	807
Nicaragua	19	27	38	59	43	126
Panama	3	5	5	7	10	233
Caribbean	107	136	121	134	139	30
Cuba	31	37	29	21	27	-13
Dominican Rep.	27	44	44	58	59	119
Haiti	35	35	31	39	37	6
Jamaica	3	2	2	2	1	-66
Puerto Rico	10	15	12	12	13	30
Trinidad/Tobago	1	3	3	2	2	100
Colombia	352	468	483	740	845	140
Northern Latin American Total	711	1102	1214	1707	2104	196

*1948-52 average; _1961-65 average; †1969-71 average

Source: FAO Production Yearbook (various years)

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Table 3: Relationship Between Arable Land, Permanent Cropland, and Coffee Area, 1990 (in 1000s of hectares)

Country	Total Arable	Permanent Cropland	Perm. as % of Total Arable	Coffee Area	Coffee as % of Perm. Crop

Mexico	23150	1560	7	669	43
Central America	5459	1435	26	755	53
Costa Rica	285	244	86	95	39
El Salvador	565	168	30	173*	100
Guatemala	1400	485	35	244	50
Honduras	1610	210	13	144	69
Nicaragua	1100	173	16	74	43
Panama	499	155	31	25	16
Caribbean	4512	1685	37	298	18
Cuba	2608	722	28	100	14
Dom. Rep.	1000	446	45	103	23
Haiti	555	350	63	34	10
Jamaica	207	62	30	6	10
Puerto Rico	68	59	87	46	78
Trin./Tob.	74	46	62	9	20
Colombia	3900	1520	39	1000	66
Northern Lat. Am.	37021	6200	17	2722	44

*figure exceeds the "permanent cropland" figure, not an uncommon observation in FAO statistics.

Source: FAO Production Yearbook (1991)

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Table 4: Coffee's Contribution to Total Exports (in trade value) in Northern Latin America, 1965-1993					
(expressed in percentages)					
	1965	1975	1985	1990	1993
Mexico	5.9	6.8	2.3	1.4	0.94

Central Am.*	35.6	22.2	41.2	26.1	18.0
Costa Rica	41.7	19.6	34.1	16.8	10.1
El Salvador	50.6	32.9	66.7	46.1	30.9
Guatemala	49.6	26.3	39.4	26.8	20.0
Honduras	17.5	19.4	22.2	19.5	15.8
Nicaragua	18.4	12.8	43.6	21.0	13.2
Panama	1.0	0.8	4.9	4.4	2.2
Caribbean					
Cuba	--	--	0.6	0.5	0.84
Dominican Rep.	16.8	4.9	12.6	6.3	4.98
Haiti	--	18.1	21.5	15.8	13.43
Jamaica	0.3	0.4	1.3	0.8	1.87
Puerto Rico	--	--	--	--	--
Trinidad/Tobago	0.4	0.2	0.1	0.1	0.04
Colombia	63.8	45.8	49.1	21.0	16.21

*Average for Central America does not include Panama in the calculation.

--data not available.

Source: FAO Trade Yearbook (various years)

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Country	Number of farms	Number of small farms	Small farms as percentage
Guatemala	43,352	34,000	78
El Salvador	43,779	34,569	79
Honduras	38,800	37,881	98
Nicaragua	17,483	14,924	85
Costa Rica	65,000	55,250	85
Panama	30,742	29,000	94
Central Am.:	239,156	205,624	(average) 86
Colombia	302,945	223,574	73

Mexico	280,333	274,835	98

Note: "small" defined as farms under 10 ha. in Central America and Mexico, and under 12 ha. in Colombia

Source: USAID/ROCAP, 1981; Colombian Coffee Federation document, 1991; INMECAFE Coffee Census, 1992

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Origin of Bean	Pesticide Detected	Amount Detected (ppm)	Detection Limit	Tolerance (i.e., legally allowable level)
Colombian	BHC	0.001	0.001	None
	Aldrin	0.001	0.001	None
	DDT	0.002	0.001	None
Guatemalan	BHC	0.002	0.001	None
	Lindane	0.003	0.001	None
	BHC	0.002	0.001	None
Brazilian	BHC	0.008	0.001	None
	BHC	0.002	0.001	None
	Lindane	0.003	0.001	None
	BHC	0.003	0.001	None
	Aldrin	0.001	0.001	None
	DDE	0.001	0.001	None
	DDD	0.001	0.001	None
DDT	0.012	0.001	None	

	Chlordane	0.009	0.005	None
Haitian	BHC	0.001	0.001	None
	BHC	0.001	0.001	None
	DDD	0.001	0.001	None
	DDT	0.019	0.001	None

Source: Shelley A. Hearne, *Harvest of Unknowns: Pesticide Contamination in Imported Foods* (New York: Natural Resources Defense Council, 1984).

VIII. References [\(Table of Contents\)](#)

References are available upon request from the authors.

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