Trade in Environmental Services and Sustainable Development in Central America:

The Cases of Costa Rica and El Salvador

(Summary)

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Introduction

In Central America, the debate on trade and environment is only just beginning. It would seem, in fact, that it is more than just a debate, since the initiatives are becoming part of the agendas of regional organizations. At the same time, this region is seeing the emergence of initiatives more closely tied to the environmental agenda, which is becoming aligned more closely with trade mechanisms geared to the "sale of global environmental services" such as carbon sequestration, greenhouse gas emission reductions and conservation and sustainable use of biodiversity.

While at the international level there has been an important debate on the links between trade and the environment, the initiatives on trade in environmental services are relatively recent. Nevertheless, the scope of the debate has qualitatively broadened from a position characterized by fear and contradictions between trade and environmental policies, to one geared to finding common ground on trade liberalization, development and environmental protection. Still, given the new possibilities and potential that these spheres of management create, the analysis of the links is much more complex. There is a consensus that neither the WTO nor the multilateral environmental accords can single-handedly resolve or overcome the contradictions between trade and the environment. A greater interaction between these spheres of management and negotiation is required.

Central America is witnessing the emergence of unprecedented trade, development and environmental opportunities. Although the subject of trade in environmental services is marginal to the debate on trade and sustainable development, in this region there have been significant advances in regard to the emergence of markets. Global environmental services with trade potential represent latent opportunities for the region, and are the basis of a number of initiatives and of cumulative experience prior to the opening of these markets. More than the trade dynamic as such, these opportunities are closely linked to environmental agreements that find an institutional expression at the regional, national and global levels. The Kyoto Protocol's joint implementation initiatives and the proposals on biodiversity conservation and sustainable use clearly illustrate these new opportunities in Central America. They are bringing about creative strategies for mobilizing financial resources, the building of the relevant institutional apparatus, and the potential for coordinating these opportunities with the progress of development. This document presents two cases that illustrate the various conditions and advances made toward the creation of the markets in environmental services.

The first case analyzes the opportunities related to greenhouse gas emission reductions in Costa Rica that stem from the Kyoto Protocol. This case illustrates the importance of an institutional framework (global, regional and local) capable of facilitating and promoting trade in environmental services. The existence of the necessary environmental institutional framework in Costa Rica as well as the strategic impetus from wealth-generating sectors such as ecotourism has enabled this country to become a leader in the negotiation and execution of activities implemented jointly (AIJ) for the consolidation of its system of conservation areas. But also, Costa Rica is a pioneer in identifying creative mechanisms for mobilizing financial resources—such as Certified Tradable Offsets (CTOs)—within the logic of a global environmental services market.

The study of the Costa Rican experience outlines the new opportunity for developing countries, created by the operation of the Kyoto Accords. These countries can implement projects to reduce greenhouse gas emissions with financing from industrialized countries, in exchange for transferring the credits for these reductions to the financing countries, resulting in the creation of a market for this service.

Costa Rica has risen to the joint implementation opportunities and has the capacity to bring them to fruition, particularly given the entry into operation of the Clean Development Mechanism. The creation of this trade in environmental services would create incentives for land use changes, especially from extensive ranching and annual cultivation to forestry, through domestic mechanisms of payment for environmental services. In fact, mechanisms of this type are being used by small and medium-sized producers, a significant departure from the traditional forestry incentives which mainly targeted large forestry producers.

The second case deals with the environmental services produced by El Salvador's "coffee forests." In the absence of significant forest cover, coffee plantations have become established in key areas for the provision of environmental services, though it is clear that these areas are insufficient given the degree of the country's environmental degradation. Mechanisms arising from the global environmental negotiations on sustainable use and biodiversity and on climate change represent unprecedented opportunities to promote processes that will not only make productive sectors—such as coffee cultivation—more economically viable, but will also constitute important mechanisms for developing a domestic reforestation strategy.

Given the viability problems of Salvadoran coffee production and the lack of institutional capacity for environmental management, the implications of global negotiations on sustainable use of biodiversity and climate change represent unparalleled opportunities to initiate processes aiming to reverse domestic environmental degradation. The potential access to resources through joint implementation mechanisms or global environmental service markets is an opportunity that could substantially improve the viability of sectors such as coffee production. However, while it has clear potential, trade in environmental services presents some challenges for El Salvador: i) the mechanisms arising from the emerging global environmental services market must be augmented by a domestic institutional and management framework capable of maximizing positive environmental and social impacts; ii) trade in environmental services creates possibilities for domestic policies (e.g. relating to water, energy, agriculture and ranching, and environment) to link with a strategic management system capable of stimulating the reversal of the country's environmental degradation; iii) the sale of environmental services produced in the northern highlands will help reverse the degradation in this area by becoming part of the sustainable livelihood of rural producers. This involves seeing beyond the proposals and projects on shade-grown coffee and promoting other technological alternatives that combine production and natural resource conservation.

The two cases reflect different processes. While El Salvador is facing severe deforestation driven by an economic dynamic that is accelerating land use changes, Costa Rica has increased its forested areas under a strategy that favours conservation. This is understandable, given its importance for strategic sectors such as ecotourism. In both countries, the relevance of environmental services is clear, in view of the vital need to maintain and increase the permanent vegetation cover. In both, external opportunities that link environmental services to payment arrangements for these services are potential factors that could be incorporated into environmental, industrial, and above all, developmental management.

Greenhouse Gas Emission Reduction Trading: The Case of Costa Rica

1. The Point of Departure: A Global and Regional Institutional Framework

Climate change was initially recognized as a serious problem at the First World Climate Change Conference held in 1979, when a declaration was issued calling on world governments to prevent potential climate changes from having adverse effects on human beings. In 1988, the Intergovernmental Panel on Climate Change (IPCC) was established and mandated to evaluate the current information on climate change and its potential impacts, as well as to develop a strategic framework for mitigation or adaptation to these climate changes.

At the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, 154 governments signed the United Nations Framework Convention on Climate Change (FCCC) which establishes that the industrialized countries must take measures to stabilize the concentrations of greenhouse gases in the atmosphere. In December 1997, the Conference of Parties[1] adopted new commitments in the form of the Kyoto Protocol, which establishes more ambitious emission reduction agreements for developed countries.

The Kyoto Protocol commits industrialized countries to reducing their emissions of the six main greenhouse gases to 5% above 1990 levels between 2008 and 2012. It also establishes that **the countries will have a certain amount of flexibility in implementing and measuring their emissions reductions**. In particular, an international **emission rights trading** system will be set up to enable industrialized countries to buy and sell emission credits among themselves and acquire **emission reduction units** by financing projects in other developed countries; and through the **Clean Development Mechanism,** to receive credits for financing emission reduction projects in developing countries. The operational guidelines of these various systems have yet to be worked out.[2]

At the Central American level, the Regional Treaty on Climate Change (*Tratado Regional de Cambio Climatico)* was signed by Guatemala, Honduras, El Salvador, Nicaragua and Costa Rica. It empowers the Central American Commission on Environment and Development (*Comisión Centroamericana de Ambiente y Desarollo*—CCAD) to take the initiative to consolidate a 1993-2005 action plan to create and strengthen the Central American Climate Change Control System (*Sistema Regional de Control de Cambio Climático*).

Also created was the Central American Council on Climate Change (CCCC) under CCAD, and the Regional Committee on Water Resources (*Comité Regional de Recursos Hydráulicos*—CRRH) was put in charge of coordinating regional efforts to standardize policies relating to the development of the Regional Climate Change Control System (*Sistema Regional de Control de Cambio Climático*).

[1] The Conference of Parties (COP) includes all States that have ratified the Convention; the Conference held its first sessions in Berlin in 1995.

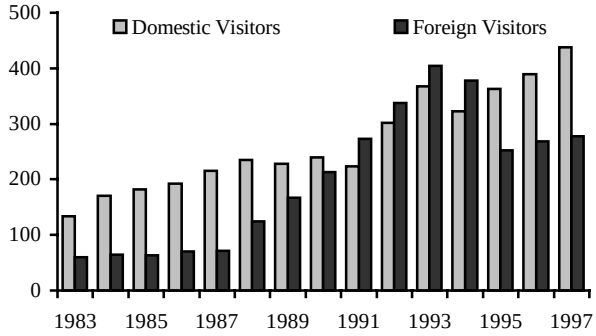
[2] The guidelines were expected to be defined at the fourth Conference of Parties held in November 1998 in Buenos Aires. However, a definition was not arrived at, and will have to await the fifth meeting scheduled to be held in Germany.

2. Costa Rica Ventures into the International Environmental Services Market

2.1 Development Strategy in Costa Rica

To attract foreign capital, Costa Rica has developed creative environmental strategies including debt-for-nature swaps and agreements on biodiversity use. It was the first developing country to open a Joint Implementation office for activities of this type. More than half of the pilot projects approved for developing countries are located in Costa Rica. It is of interest, then, to understand this framework that has enabled the country to seize opportunities in the emerging carbon trading market.

Figure 1
Visitors to Costa Rica's national parks, 1983-1997 (thousands)



Source: Acuña and Orozco (1997)

Costa Rica bases its sustainable development prospects on two key sectors: tourism and energy. In recent years, the structural change in the composition of exports has become clear. Traditional exports such as coffee, bananas, meat and sugar, which made up almost 65% of exports in 1975, had fallen to just 32% of exports by 1995. This change began to be solidified in 1987 with the promotion of exports to markets outside of Central America.

Table 1
Costa Rica: revenue from tourism and exports 1990-1997 (million US$)

Year	Exports	Foreign exchange from tourism	Foreign exchange from tourism as a percentage of exports
1990	1,448	275.0	19.0%
1991	1,598	330.6	20.7%
1992	1,851	431.1	23.3%
1993	2,009	577.4	28.7%
1994	2,336	625.7	26.8%
1995	2,844	659.6	23.2%
1996	3,014	688.6	22.8%
1997	3,280	719.3	21.9%

Source: Estado de la Nación Project (1998).

Particularly important in this export diversification is the tourism sector, which has shown impressive growth since the mid-1980s and now forms one of the main economic growth areas. From 1987 to 1995, the number of tourists visiting the country grew at an average annual rate of 15%, reaching a record 800,000 in 1993. Table 1 shows how the influx of foreign exchange from tourism more than doubled between 1990 and 1997 (Acuña and Orozco, 1997). The growth in the tourism sector has been better than the world average, due in part to its positioning in the market segment known as ecotourism or nature tourism, a type of tourism based on natural attractions (See Figure 1).

Thus, tourism has become an important stabilizer of the balance of payments through its contribution to foreign exchange

generation, while its contribution to employment at least partly explains Costa Rica's exemplary showing in Latin America for its low open unemployment in recent years. The electricity sector has also experienced strong growth in recent years—faster than the GDP. As a result, the electrical sector has captured a significant share of total energy consumption, from 3% in the 1970s to almost 19% currently. The majority of installed electricity generation infrastructure is made up of hydroelectric plants (71.8%), followed by gas turbine (16.3%), diesel (5.2%) and geothermal (4.8%) plants.

A vision of sustainable development for Costa Rica based on these two areas is possible if the processes of environmental degradation in the country, e.g., deforestation and watershed deterioration, are taken into account. Stopping and reversing these processes is critical for the development of these two vital sectors, which both depend on the presence of forest cover. This logic has pushed Costa Rica to make strong decisions on the use of its natural resources, particularly its forested areas. Maps 1 and 2 show that national parks (areas favoured by visitors) are located in areas with relatively high forest coverage.

2.2 Institutional Framework Involved in Payment for Environmental Services

This institutional framework includes an appropriate legal framework, coordinated policies and the creation of institutions geared to the international carbon sink market, with the promise it shows for generating revenue for the country from payment for a global environmental service.[3]

2.2.1 Legal Framework

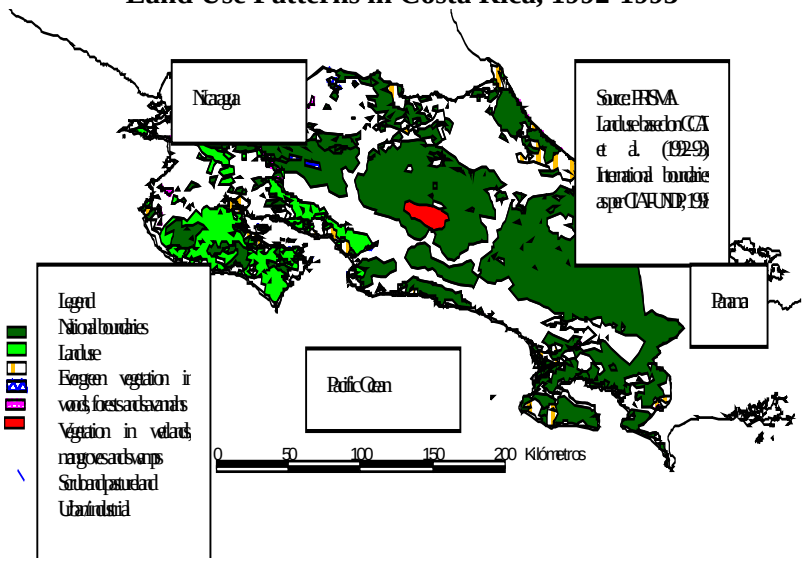
The country had one of the world's highest deforestation rates during the 1960s and 1970s, with thousands of hectares of forest lost to cultivation or pasture. Deforestation reached rates of 50–60,000 ha/year, but have since decreased. In 1990 deforestation was 18,000 hectares and in 1994 it was reported at 4000 hectares, a result at least partly attributable to policy changes and the fact that fewer forests are unprotected (LeBlanc, A., 1997).

This process has been a long one, beginning in 1979 when the first Forestry Law (no. 4465) was passed. It created what is known as the "First Generation of Incentives," which consist essentially of income tax deductions. Between 1979 and 1990, over 35,000 hectares were replanted. The second Forestry Law, passed in 1986, created two systems of incentives: one direct—a subsidy for investments in forestry plantations known as a Forestry Certificate (*Certificado de Abono Forestal*—CAF)—and the other indirect, a support for private investment known as Section 87. These initiatives, termed the "second generation of incentives," were considered a landmark step in the democratization of incentives, which according to the World Bank, had previously only benefited large landowners and consequently were not justified in terms of equity (MINAE-FONAFIFO, 1998). The Ministry of Natural Resources, Energy and Mines (MIRENEM) was also created in 1986.

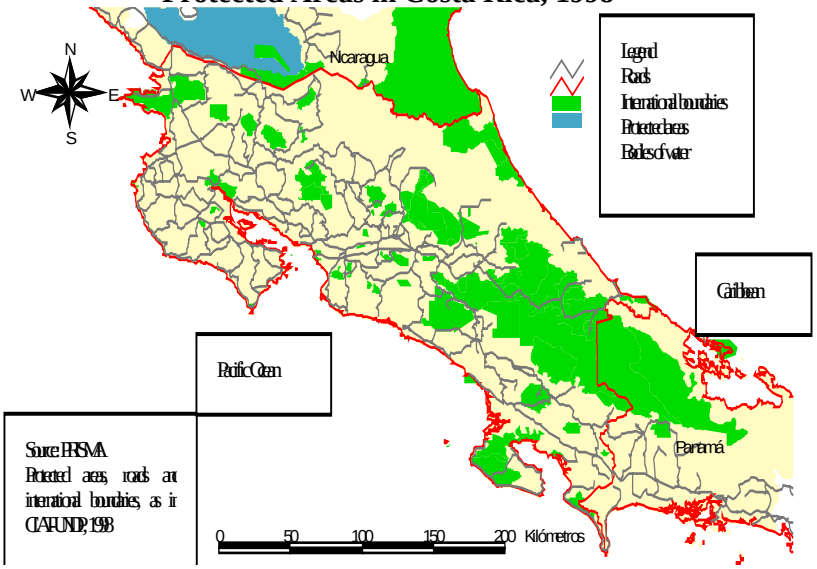
In the 1990s, the Figueres administration (1994-1997) passed a new Forestry Law (no. 7575) featuring a series of innovations. It established payment for environmental services and its funding mechanism (a fuel tax); created the National Forestry Office and the National Forestry Fund (FONAFIFO) (independent bodies specializing in private sector development) and created the National Forestry Management Certification System (*Sistema Nacional de Certificación Forestal para el Manejo de Bosques*) (see Sidebar 1).

[3] According to a MINAE study, in 2000 Costa Rica could generate US$12 million annually from carbon emissions trading; in 2001, US$17 million, and from 2001 on, the amount could progressively increase above US$20 million annually.

Map 1
Land Use Patterns in Costa Rica, 1992-1993



Map 2
Protected Areas in Costa Rica, 1998



The recognition of the environmental services available from forests and forestry plantations in Costa Rica raised the issue of incentives once again, leading to the establishment of a system of compensation for environmental services. The underlying idea was to place a value on these environmental services in order to establish a market of sorts, where the beneficiaries of these services (users) could pay the providers (producers). With this “user pay” principle, the costs incurred in the conservation of forests and forestry plantations are duly compensated (MINAE-FONAFIFO, 1998).

The new administration of President Miguel Ángel Rodríguez (elected in February 1998) implemented a national dialogue process known as Dialogue for a Shared Future (*Diálogo Hacia un Futuro Compartido*) (officialized by Executive Order no. 27106). One of the process’s achievements was the release of a report containing the discussion, proposed actions, strategies and mechanisms for consolidating the entire system of payment for environmental services. This fact illustrates how far

Sidebar 1

Payment for Environmental Services in Costa Rica: Chronology of Developments

1979: The first Forestry Law (no. 4465) was enacted. It introduced the "first generation of incentives," which consisted of income tax deductions on reforestation investments.

1986: A new Forestry Law was passed. It introduced the "second generation of incentives," whose instruments were the Forestry Certificate and the Reforestation Certificate (*Certificado de Abono Forestal por Adelantado*—CAFA)

1990: The Forestry Certificate program was expanded and the Costa Rican Forestry Council was created.

1992: Rio de Janeiro hosted the Earth Summit, during which the United Nations Framework Convention on Climate Change was approved. It was agreed that the industrialized countries must take measures to stabilize concentrations of greenhouse gases.

1994: Ratification of the Framework Convention on Climate Change by the government of Costa Rica.

1994: The governments of Costa Rica and the United States signed a memorandum of understanding on sustainable development, cooperation and joint implementation measures to avoid and reduce gases that contribute to the greenhouse effect.

1995: Costa Rican Joint Implementation Office (*Oficina Costarricense de Implementación Conjunta*—OCIC) created and put in charge of negotiation and international marketing of CTOs.

1995: The National System of Conservation Areas (*Sistema Naciónal de Áreas de Conservation*—SINAC) was put into operation through a merger of the parks, wildlife and forestry departments.

1996: The new Forestry Law (no. 7575) was passed, introducing a series of major innovations including payment for environmental services and its financing mechanism (a fuel tax).

1996: The National Fund for the Conservation and Development of Greenhouse Gas Sinks and Deposits was created. Its purpose is to see that foreign investments go into a fund dedicated exclusively to executing national AIJ projects.

1996: Norway and Costa Rica signed a cooperation and joint implementation agreement.

1997: Holland and Costa Rica signed a cooperation and joint implementation agreement.

1997: The Kyoto Protocol created a real demand for carbon among the industrialized countries. Through the Clean Development Mechanism, these countries can acquire certified emission reductions to apply against their commitments.

1997: **Payments for environmental services** are made to small and medium-sized private landowners through FONAFIFO.

1997: **Two agreements on payment for water-related environmental services** were signed by the Foundation for the Development of the Central Volcanic Range (*Fundación para el Desarrollo de la Cordillera Volcánica Central*—FUNDECOR), FONAFIFO, and the hydroelectric company Energía Global de Costa Rica, S.A.

1997: **The first sale of CTOs** took place involving the government and A consortium of private Norwegian companies. **200,000 metric tons of carbon** were sold for a total of $2 million.

1998: A cooperation and joint implementation agreement was signed with Switzerland and Finland.

1998: Payment for environmental services became part of the Costa Rica national dialogue process following the change in government. Frameworks for action and strategies were identified to consolidate the system of payment for environmental services.

Source: Based on OCIC (1998) and MINAE-FONAFIFO (1998) data

acceptance of this concept has come and the relevance it holds for the sustainable development aspirations of Costa Rican society. Sidebar 1 lists the chronology of developments in the process towards payment for environmental services. Unarguably, Costa Rica has maintained a consistent effort at a high cost relative to its economic means. It has committed itself to protecting 25% of its territory and allocated $14 million (1997) to payment for environmental services. This illustrates Costa Ricans' awareness of the key role an environmental service sector plays in their development (see Table 2).

Table 2
Investments made with forestry incentives
and payment for environmental services of reforestation and forest protection and management

Incentive type	Income tax	CAF and CAFA	CAFMA	FDF	FONAFIFO credit	CPP	PSA	TOTAL
Amount (million US$)	40.4	45.6	4.8	6.8	2.2	6.8	14.0	115
Area subject to incentive program (ha)	35,597	71,904	22,120	12,789	2,800	22,199	95,536	26,2945

CAF : Forestry Certificate
CAFA : Reforestation Certificate
CAFMA : Natural Forest Management Certificate
FDF : Forestry Fund
FONAFIFO : National Forest Fund
CPB : Forest Protection Certificate
PSA : Payment for Environmental Services since 1997 including reforestation and forest management and protection.
Source: Based on MINAE and FONAFIFO (1998)

The new Forestry Law (no. 7575) establishes a ban on land use changes and the establishment of any type of plantation on public and private forested holdings. These holdings can only be exploited with a management plan that identifies the potential environmental impacts (Alfaro and Segura, 1997). Forest owners who wants to apply for payment for environmental services must prove that their holding has not been subjected to timber harvesting in the two years prior to the application for the certificate or during the period it is in effect, a minimum of 20 years. In 1994 Costa Rica ratified the Framework Convention of Climate Change (FCCC) making it a Law of the Republic (no. 7414). In so doing, it incorporated legislation on the climate change problem into its legal framework and created an opportunity for the country's inclusion in the new structure of relations among FCCC signatory countries. At the international level, the country has concluded bilateral agreements with the United States government[4] to establish a program designed to develop and promote joint implementation initiatives with financial support from the US private sector during the pilot phase set out in Kyoto. Similar agreements were concluded with Norway (1996), Holland (1997) and Switzerland and Finland (1998), and are currently being negotiated with Canada and Germany (OCIC, 1998).

2.2.2 Policy Framework

Notable policy changes achieved in the process include the development of reforestation incentives, which have evolved from a production-oriented strategy to a conservation-oriented one, and the updating of the Forestry Law. The main achievements of these forestry policies include an increase in the reforestation rate; more research and expertise on native tree species and their increasing use for reforestation; job creation; reclamation of degraded land; and the inclusion of peasants and women in the reforestation process in some rural areas (Segura, Kaimowitz and Rodríguez, 1997).

In the energy sector various developments have tended to encourage emissions trading. For instance, the country intends to eliminate its use of thermal energy by 2001 (Dutschke and Michaelowa, 1997). Additional developments include the introduction of "Ecomarchamo," a program of emissions testing

[4] Letter of Intent for Sustainable Development, Cooperation and Joint Implementation of Measures to Avoid and Reduce Greenhouse Gas Emissions, signed in 1994.

for vehicle owners to help offset possible emissions increases in other sectors in the coming years, since this would produce a net effect unfavourable to trade in environmental services.

2.2.3 New Institutions

In July 1995 the government and the private sector signed a cooperation agreement to create the Costa Rican Joint Implementation Office (OCIC). This agreement was signed by the Ministry of the Environment and Energy (*Ministerio del Ambiente y Energía*—MINAE), the governing body of the environmental sector; the Coalition of Development Initiatives (*Coalición de Iniciativas de Desarollo*—CINDE), representing the segment of the private sector specializing in attracting investments; FUNDECOR, a nongovernmental organization with a recognized track record on forestry issues; and the Costa Rican Association of Electricity Producers, representing private producers. With a view to legally consolidating this initiative, an executive order elevated the OCIC to the status of highest-ranking technical-administrative office for decentralization under the MINAE (OCIC, 1998).

Executive Order no. 25067 of the MINAE created the Gas Fund (1996), whose objective is to channel foreign investments into a fund exclusively dedicated to the execution of the terms stipulated in national joint implementation projects. In addition to this institutional framework relating to the emissions trade, support is also provided by an institutional structure (universities and research centres) specializing in the protection of natural resources. The government is shedding the role of sole actor it held in the past (MINAE-FONAFIFO, 1998).

Another of the country's relevant experiences consists of payment for environmental services in exchange for the use of water resources in the Central Volcanic Range Conservation Area. It consists of a voluntary agreement by the hydroelectric company Energía Global de Costa Rica S.A. to pay for forest-derived environmental services. The Company undertakes to pay FONAFIFO $10/ha/year for the protection and reforestation of two sub-basins being used for hydroelectric projects (Córdoba and Reyes, 1998). These developments illustrate the institutional framework created in this country with the objective of achieving sustainable development in general, and payment for environmental services in particular. Much of the success anticipated by Costa Rica in the marketing of this environmental service will be based on this institutional framework. The State has played a fundamental role in this process. Through the creation of this institutional framework that operates in a coordinated and transparent manner, it is promoting an awareness of these services.

3. Joint Implementation and the Clean Development Mechanism

The Kyoto Protocol established three mechanisms by means of which industrialized countries can obtain credit for reductions achieved in other countries. The first of these is Emissions Trading, which is limited exclusively to Annex I countries.[5] The second, known as Joint Implementation, consists of investments by industrialized countries in the implementation of emission-reducing projects in other industrialized countries. In exchange, the beneficiary country transfers its reduction rights to the investing country. A third is the Clean Development Mechanism, a form of Joint Implementation in which the investing country holds reduction commitments and the project-implementing country belongs to the non-annex I group. A proviso under the same protocol states that the emission reduction will be effective beginning in the year 2000.

[5] Developed countries with greenhouse gas reduction commitments.

This means that the international trade in greenhouse gas reductions by Costa Rica will begin this year. However, some experiences are already underway in the country under the Joint Implementation Activities pilot phase, during which investing countries are not entitled to obtain credits for reductions arising from the projects.

3.1 Activities Implemented Jointly (AIJ)

The Costa Rican government officially began developing AIJ programs and policies in mid-1994, assisting in the development of over 15 project proposals. The Greenhouse Gas Fund will channel funds from private foreign investments and other sources into the development of three national umbrella projects within the AIJ framework: the Protected Areas Project (*Proyecto de Áreas Protegidas*—PAP), the Private Forestry Project (*Proyecto Forestal Privado*) and the Renewable Energy Project (*Proyecto de Energías Renovables*). The beneficiaries of these funds will in turn transfer their carbon credit rights to the Fund. The "carbon credits" or Certified Tradable Offsets (CTOs) represent the Costa Rican government's guarantee that they are backed by sufficient carbon stores.

The Protected Areas Project (Leblanc, 1997) will consolidate and protect 555,052 hectares of land located within conservation areas that have been designated as protected but still not entirely State-owned. The project will be jointly administered by the SINAC, the OCIC and the National Parks Foundation. In addition, park entry fees and other charges may be levied to bolster the operating budget. The Private Forestry Project will provide payment for greenhouse gas mitigation to approximately 20,000 small and medium-sized landowners, complementing the PAP in buffer zones adjoining national parks. The FONAFIFO will administer this umbrella project and report the associated certification of compensation to the OCIC. The payments will be made to landholders in exchange for environmental services constituted by a range of sustainable forestry practices including reforestation, conservation and management. Under this program trees may not be cut for 20 years. Under the renewable energy umbrella project, three wind energy projects and one hydroelectric project have been developed. Table 3 lists the AIJs and their main characteristics.

These projects illustrate the integration of the AIJ program with the tourism, forestry and energy sectors. In the case of the tourism sector, the objectives of all of the forestry projects include conservation of protected areas and consolidation of buffer zones. The forestry sector benefits from integrated reforestation projects through incentives such as payment for environmental services, preferred lines of credit, technical assistance and access to markets for sustainably produced timber. In the case of the energy sector, the Cooperative Association of Electrical Energy Producers, a group made up of small producers, the Costa Rican Energy Institute and foreign investors are the main participants under a switching arrangement from electricity to renewable energy.

Table 3
Joint implementation activities in Costa Rica reported to the Secretariat of the Climate Change Convention as of June 16, 1998

Project type	CO_2 fixed and/or reduced (thousand metric tons)	Project description and objectives
Biodiversifix (approved in July 1995)	18,480	Comprises two subprojects, WETFIX and DRYFIX, including regeneration of degraded wet and dry tropical forest areas in the Guanacaste Conservation Area. The project life cycle is 50 years.
ECOLAND	1,343	Includes the purchase of approximately 2,500 ha of private property in the

(approved in 1994)		zone of Piedras Blancas National Park. The project life cycle is 16 years.
CARFIX	21,777	The project aims to preserve the existing carbon stock and increase fixation capacity in the Central Volcanic Range Conservation Area (buffer zones for Braulio Carrillo National Park).
KLINKI	7,216	This project aims to demonstrate that CO_2 fixation is an economic opportunity that does not entail the interruption of timber production or conservation benefits.
Woodland reforestation and conservation (Río Virilla Watershed Project)	231	An integrated project involving conservation of a primary forest area of 2,000 ha, protection and management of 1,000 ha and reforestation of 1,000 ha.
Tierras Morenas wind energy	119	Construction and operation of a 20 MW hydroelectric plant near the city of Tierras Morenas in Guanacaste province.
Plantas Eólicas S.A.	223	Construction and operation of a private 20 MW wind energy generation plant near the city of Tejona in Guanacaste province.
Aeroenergía S.A.	36	A private 6.4 MW electricity generation project based on 16 wind turbines. This generation will replace fossil fuel generation.
Doña Julia Hydroelectric Project	211	Construction and operation of a 16 MW hydroelectric plant. The electricity generated will lead to the phase-out of thermal units.

Source: Climate Change Convention Secretariat – United Nations (1998)

These projects show a great deal of variation in terms of costs per ton of carbon sequestered (based on Dutschke y Michaelowa, 1997). For the forestry projects, the costs are as follows: 1) Biodiversifix: US $11.5; 2) ECOLAND: US $4.4; 3) CARFIX: US $2.12; 4) Klinki: US $5.42. For the energy projects, the cost per ton of carbon is considered to be between US $400 and $900 (due to Costa Rica's 2001 target for eliminating its fossil fuel-based energy production), which reduces the duration considered for these projects.

The financial instrument for the international marketing of certified emission reductions is known as a CTO (certified tradable offset), and is defined as a measurable quantity of certified greenhouse gas emission reductions, expressed in equivalent carbon units, that have been or will be reduced or avoided. By issuing CTOs, the government agrees to back the validity of the mitigation for 20 years, guaranteeing additional offsets where discrepancies with certified reductions are proved (OCIC, 1998). In December 1997, the country satisfied the two main conditions for trading on the international markets: creation of an international marketing trust fund and acquisition of the lands with the resources that would generate the environmental services. Subsequently, with the support of the Land Council (*Consejo de la Tierra*), the country is preparing for marketing through the Chicago Board of Trade's Center for Finance.

A base price of $10–$20 US per ton of carbon reduced has been set, and optimistic expectations are that the market forces will drive the prices up, since this is the only internationally certified vendor. This is reported in a personal communication from Felipe Vega of JUNAFORCA, wherein he states that the value of $10 per ton of carbon is based solely on the opportunity cost of the land use change from extensive cattle grazing to forestry. The issue of the price per equivalent ton is key, since as expected, the interest of the industrialized world is to buy as cheap as possible.[6] This puts countries in

[6] The US administration intends on modest compliance with the Kyoto accords since it plans to buy 93% of its emission units at a lower cost. Its willingness to pay is $14–23/ton, which, compared with the domestic cost of approximately $125/ton, is a good incentive to purchase reduction credits from developing countries.

competition to provide the industrialized countries with the cheapest and most efficient project portfolio.

3.2 Impacts of the AIJ

The environmental impacts of the forestry projects include decreased soil erosion, increased biodiversity, reduced demand for firewood from natural woodlands, protection of aquatic habitats, decreased sedimentation, and decreased chemical use as land use patterns change from low-productivity crops to woodlands or forestry plantations.

The renewable energy projects will decrease the use of fossil fuels, thereby lowering the country's air pollution. However, each project also has various potential negative effects associated with site preparation and various types of public works and physical adjustments. The hydroelectric projects, such as Doña Julia, involve major modifications to the natural environment that generally have significant effects on the site. The gas reduction impacts are considered from various angles. On the one hand, they prevent greenhouse gas emissions from deforestation, while on the other hand, continuous reforestation can sequester emissions for some time, while energy production and use patterns change. In the case of the energy projects, the impact calculations are based on the quantity of carbon emissions avoided due to the replacement of fossil fuel-based generation by wind and hydroelectric generation.[7]

A number of authors concur that Costa Rica features particular characteristics—among them, relative political and financial stability and institutional development in energy and forestry—that lend the country credibility and make it attractive in the eyes of foreign investors. The country is also said to have the capacity to demonstrate that its carbon emission reductions are real. This is a critical element in the discussions around the implementation of the Kyoto Protocol, which establishes the requirement that the baseline in the absence of projects be clearly justified and transparent.

In the social realm, there is an expectation of desirable impacts including job creation, increased revenue for project participants and localities, technology transfers, environmental education and forestry training. Nevertheless, the projects' negative social impacts, which include land purchases and relocation of local populations, are not receiving attention. The extent of potentially ensuing social conflict is not being assessed. Such conflicts have been known to occur in past cases of land expropriation, as in the case of Santa Elena, now before an international arbitration tribunal, and the case of the gold mining incursions into Corcovado National Park (MINAE-FONAFIFO, 1998).

In terms of economic impacts, the expected financial flows stemming from the AIJ are estimated at US $ 251.4 million. By September 1998, approximately US $140 million had been invested in the country (OCIC, 1998). Under the Territorial Consolidation of National Parks and Biological Reserves project, the marketing of 16 million tons of carbon is proposed. This represents an investment of at least US $160 million in Costa Rican conservation efforts by the industrialized world (MINAE-FONAFIFO, 1998). According to the MINAE's calculations, if investment is maintained at 1997 levels, the country will be able to sell US $12 million worth of carbon in 2000, $17 million in 2001 and $21 million in 2002, increasing annually thereafter to approximately $20 million (MINAE-FONAFIFO, 1998). The energy projects will provide electricity at a time when demand in Costa Rica is increasing and the government intends to completely phase out thermal energy by 2001.

[7] The calculation of the impact of these projects takes account of the government's goal of eliminating electricity generation from fossil fuels and its replacement by renewable sources as of 2001.

4. Trade in Environmental Services in Costa Rica: What Remains to be Done

Recognition of and payment for environmental services in this country constitutes a positive step toward sustainable development. Costa Rica enjoys an adequate institutional and legal framework that is conducive to the internalization of and payment for environmental benefits on both a local and a global level. This condition has attracted favourable national and international attention to services that represent considerable potential sources of foreign-exchange revenues (carbon sequestration, biodiversity and scenic beauty). The local credibility has given rise to an increasing demand by small and medium producers to be paid for environmental services. This is indicative of the awareness being raised about the provision of environmental services.

However, the current system of payment for environmental services may prove to be unsustainable due to the country's fiscal situation, which prevents it from shouldering the responsibility for payment for environmental services. This has made it necessary to limit incentives to those already granted. Moreover, it has been necessary to increase the fuel tax. According to the National Forum for Dialogue (*Foro Naciónal de Concertación*), this creates a tax injustice, since the cost is not borne by the service user but by a sector of the population that does not directly enjoy the benefits deriving from the environmental services. Moreover, the outstanding debts relating to land purchases for the consolidation of protected areas will be unpayable if additional resources are not found.

This situation has been addressed by the National Forum for Dialogue, which presented an alternative environmental services payment arrangement comprising the following principles (La Nación Digital, 1999): i) ratify the principle that those who benefit from environmental services must pay into the system; ii) consolidate collection of payment for environmental carbon sequestration services from the international community, iii) internalize the environmental cost of water in the fees as a system of payment for environmental services, iv) establish a general, unified system of cash payment for environmental services.[8]

The experience of Costa Rica shows how a local sustainable development framework and decisive government participation in creating the necessary institutions can make it possible to capitalize on new trade opportunities, such as those linked to the environmental services market. A new context is on the horizon in which environmental services will constitute a sector of the economy. The financial flows from outside the country can simultaneously revitalize other sectors and help to sustain the environmental services that are key to the country's domestic development. Under Costa Rica's conservation promotion strategy, it has increased its forested land area and recognized the critical link between the maintenance and augmentation of permanent vegetation cover and the provision of environmental services. Opportunities for the international sale of environmental services together with internal mechanisms such as payment for environmental services are potential components of this sustainable development framework.

The Costa Rican example shows the relevance of an institutional framework for creating international trade opportunities for environmental services and domestic compensation through payments to producers. With a local and global institutional framework in place, it is possible to create novel mechanisms for achieving environmental goals and to reap the benefits produced by these mechanisms.

[8] The principle of the "single window" currently governing the collection of state revenues does not guarantee a sufficient budget allocation to keep up with the demand for environmental services, in terms of neither quantity nor efficiency.

Shade-Grown Coffee and Environmental Services: the Case of El Salvador

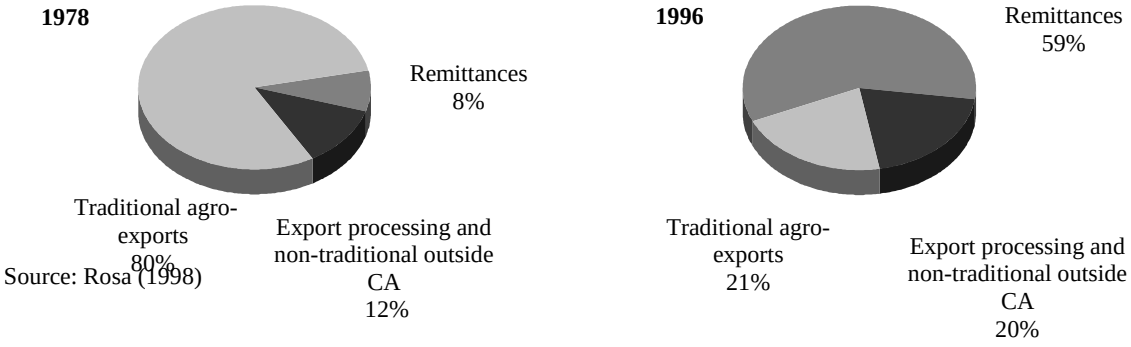
In recent decades, El Salvador has experienced major changes in land use. From an economic standpoint, these changes can be attributed to changes in the pattern of economic growth, which is no longer based mainly on agricultural exports. This change alone has caused a drop in the contribution of agriculture in general, and coffee in particular, to the generation of foreign exchange, employment, and income that provide a livelihood for the rural poor. Land use changes are impacting the capacity to provide environmental services as basic as water.

In the absence of woodlands, coffee plantations are critical to the provision of environmental services in El Salvador, yet insufficient given the degradation in the country. In order ensure the sustainable provision of environmental services required domestically, an extensive vegetation cover must be maintained and increased. In this context, the results of the negotiations on climate change and biodiversity represent unprecedented opportunities to implement the processes necessary to reverse environmental degradation. Nevertheless, this opportunity presents a number of challenges for the country: i) mechanisms arising from the emerging global environmental services market must be complemented by a domestic institutional and management system that maximizes positive environmental and social impacts; ii) trade in environmental services creates possibilities for internal policies (on water, energy, agriculture and environment) to find links with a strategic management scheme that can instigate a reversal of the country's environmental degradation; iii) given the degradation in the northern highlands and the necessity of reversing these processes, the sale of environmental services generated from these territories could form part of the sustainable livelihood of rural producers. This means seeing beyond the proposals and projects on shade-grown coffee.

1. Declining Social and Economic Importance of Coffee

At the end of the 1970s, the Salvadoran economy still depended heavily on the foreign exchange generated by traditional agro-exports (coffee, cotton, sugar cane, shrimp). Non-traditional exports together with export processing zones and remittances from abroad made up no more than one-fifth of total foreign exchange earned. This situation has changed substantially. In the 1990s, remittances represent the main source of foreign exchange, exceeding the combined contribution of traditional agro-exports, export processing and non-traditional exports to other markets (see Figure 2).

Figure 2: El Salvador's principal sources of foreign exchange, 1978 and 1996



Source: Rosa (1998)

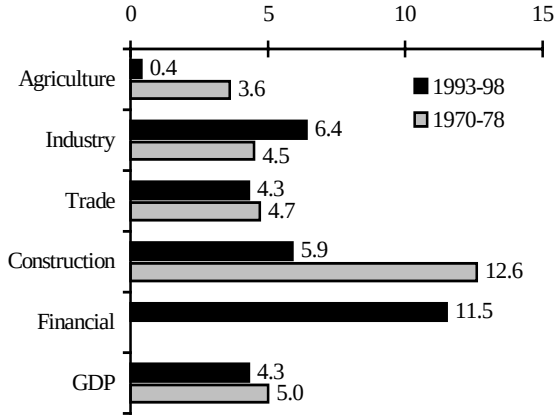
Between 1990-1998, the Salvadoran economy as a whole exhibited average growth slightly above that of 1970-1978. An analysis of growth by sector over the same periods shows that the agriculture and ranching sector constitutes the exception to the vibrancy of the 1990s (see Figure 3).

The slow growth of agriculture and ranching is due to the poor performance of the coffee crop beginning in the early 1980s and the disappearance of cotton in the 1990s, which trends are not offset by the much more vibrant performance of basic grains, sugar cane and poultry.

Coffee production is strongly affected by international price fluctuations. Since the international price bonanza of the late 1970s, when prices exceeded US $200 per quintal, prices have declined steadily, sinking to their lowest level of US $58 between 1991-1992. The coffee production trend reflects its dependency on and vulnerability to international prices, particularly since domestic prices paid to producers follow international price fluctuations (see Figure 4).

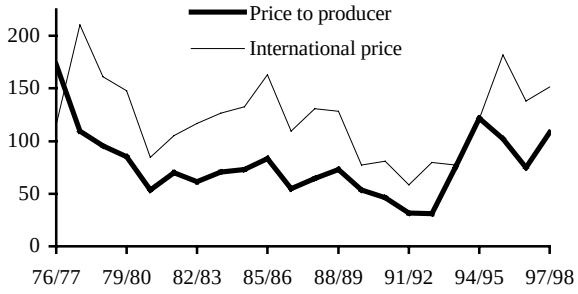
As a result, coffee's share of domestic production has shown a consistent decrease. In 1981, this item alone made up almost 10% of GDP, but had sunk to less than 3% by 1997. The sector's contribution to foreign exchange and tax revenues, as well as employment and income for the rural poor (see Figure 5), has declined accordingly. Employment in the coffee harvest fell from some 5 million person-days in 1978 to around 3 million in 1998, while real wages dropped almost 80% between 1978 and 1997. Consequently, coffee production has lost much of its capacity for generating employment and rural income as compared with the 1970s (see Figures 6 and 7).

Figure 3
El Salvador: Average annual growth rate by sector, 1970-1978 and 1993-1998



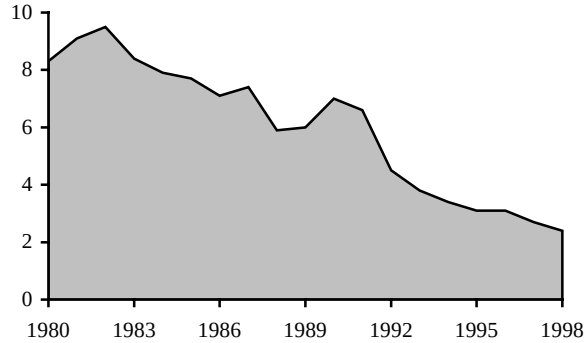
Source: Based on Central Bank data

Figure 4
El Salvador: Coffee price trends (US$/quintal gold)



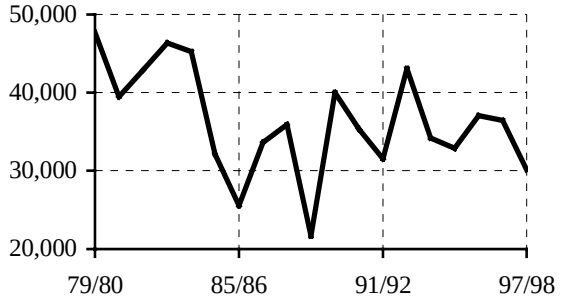
Source: Based on PROCAFE data

Figure 5
Contribution of coffee to GDP (percent)



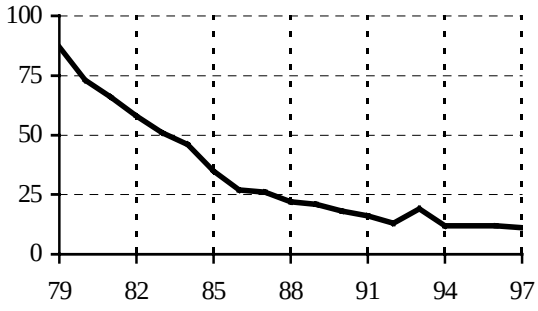
Source: Based on PROCAFE data

Figure 6
Employment in coffee harvest
(thousands of person-days)



Source: PRISMA, based on PROCAFE data

Figure 7
Real minimum wage index
from coffee harvest (1978=100)



Source: PRISMA, based on PROCAFE data

Salvadoran coffee production is primarily destined for the international market. For the 1996/1997 harvest, the breakdown of coffee exports shows that almost 97% of the coffee is of a traditional type and quality, while less than 3% consists of coffee with any degree of processing. Despite the existence of some coffee-processing initiatives, there is still a clear lack of a productive strategy for adding value to coffee bean exports. For example, organic coffee draws a premium price, yet represents only 0.23% of total exports for the 1996/1997 harvest (PROCAFE, 1998).

Fluctuations in international coffee prices and the vibrancy of sectors such as construction, commerce and industry have created strong pressure for changes in the use of coffee-producing land. This has resulted in a *de facto* conversion of areas under coffee production to urban, commercial and industrial uses. Data on the 1997/1998 production cycle shows that from an economic standpoint, leasing out land or depositing its value in a financial institution yielded much higher returns than investments in coffee plantations (PROCAFE, 1998). This is true for highland coffee plantations, which experience the least pressure from urbanization and the most economically competitive conditions; as well as for lowland plantations (closest to urban centres), which are less economically viable, and are under greater pressure.

2. The Environmental Role of Shade Coffee Plantations

While coffee production's economic importance has been declining along with its contribution to domestic production, employment and income,[9] from an environmental standpoint the land under coffee production has been playing a decisive role in the provision of environmental services vital to the country. With much coffee-producing land being converted to urban and industrial zones, the resulting lack of extensive forested tracts magnifies the importance of the existing coffee production areas. They feature a diversity of trees that provide the shade for the coffee plants, functioning as reasonable substitutes for tropical forests. Thus the term "coffee forests" applied to the coffee-producing regions of El Salvador (See Sidebar 2).[10]

[9] In social terms, in addition to the employment and income generated at the harvest stage, the coffee-growing areas are an important source of firewood. Nearly 42% of the firewood used annually comes from coffee tree pruning (Current and Juárez, 1992) and other products such as fruit and nuts that are obtained from the shade trees.

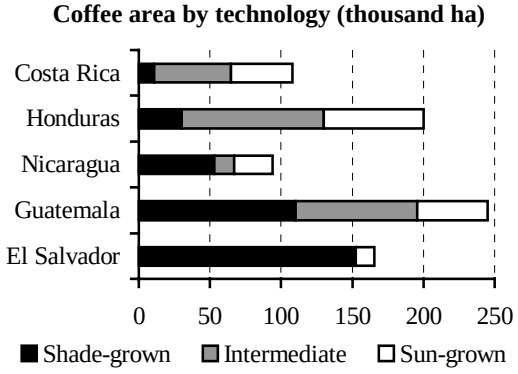
[10] This technological difference of the coffee cultivated in El Salvador by comparison with respect to the rest of the Central American countries has economic implications. According to INCAE (1998), Salvadoran coffee-growing activity tends to be more profitable than in countries like Costa Rica, which has higher average yields than El Salvador. This is because full-sun coffee technology requires the more intensive use of inputs, leading to much higher costs.

Sidebar **2**

Central America: Shade-Grown and Sun-Grown Coffee

Shade-grown coffee

This is the traditional method of coffee cultivation requiring a forest canopy. In a shade coffee plantation, the trees fix atmospheric nitrogen in the soil, eliminating or greatly reducing the need for nitrogen-based fertilizers. Pesticides are not as necessary due to the birds living under the canopy. Weeds tend to be less abundant in shaded plantations and are controlled more often with machetes than herbicides. The leaf litter accumulating under the trees harbours insects that eat nematodes parasitic on coffee trees, and so toxic nematocides are not necessary in shade coffee plantations. Since shade-grown coffee takes longer to develop, it has a higher sugar content which, when the beans are roasted, yields a more intense coffee flavour that brings a higher price on international markets. Other products, such as cacao, fruit, avocados, and firewood trees are also generally grown on shade coffee farms. Not only are these species important components of the farms' biodiversity, but they are an additional source of income. Such diversification helps small producers protect themselves from international market fluctuations, natural events and other uncertainties. As natural forests vanish, shade coffee plantations have become a refuge for migratory birds and an excellent habitat for the surviving wildlife resident in subtropical zones. Shade-grown coffee also provides an essential habitat for other tropical forest species communities. For example, the diversity of local species of beetles, ants, wasps and spiders on a single tree species on a coffee plantation approximates the arthropod diversity levels found on a single tree species in an unperturbed tropical forest. Where geographic market conditions are favourable, economically viable yields can be obtained by associating a timber crop with the coffee. Offering an alternative to deforestation, traditional coffee production systems are also an important brake on greenhouse gas emissions and their contribution to global warming.



Source: Rice and Ward

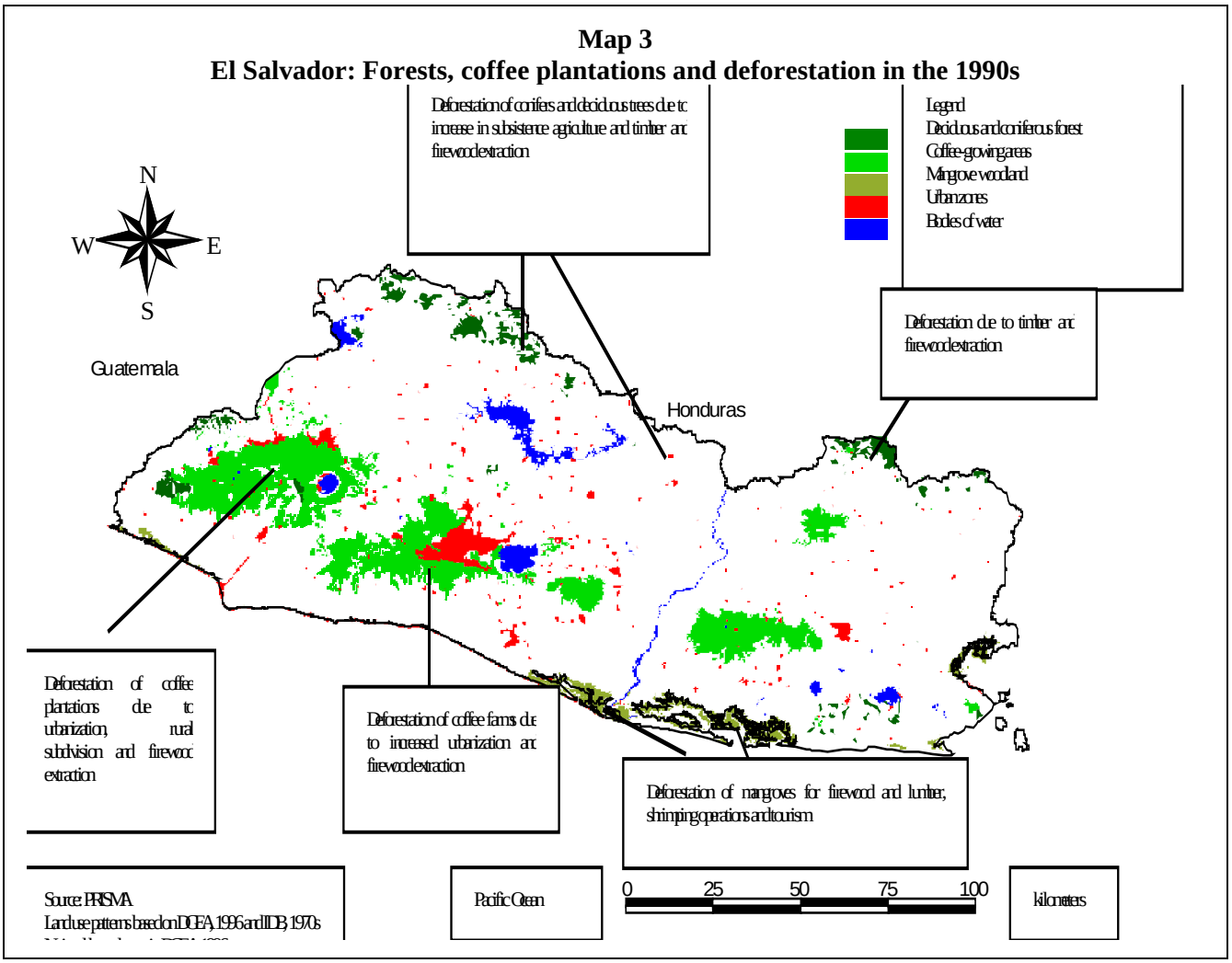
Sun-grown coffee:

In the last two decades, in an effort to cultivate more coffee and increase incomes, many Central American coffee producers have "modernized" or "technologized" their coffee plantations. This involves the use of a hybrid plant which, under full sunlight, grows three times as fast as a shade-grown coffee plant. This method increases coffee tree density from 1,000-2,000 to 3,000-7,000 per hectare under full sun. The trees live an average of 12–15 years, while the ones on a traditional plantation live more than twice as long. However, high-tech coffee farms require a much greater quantity of agrochemicals. The nitrogen-fixing bacteria are absent from the roots, and so the trees depend on a constant diet of fertilizers. Too, with the absence of the forest canopy, fewer birds are present to eat insect pests, making the use of insecticides necessary to protect the crop. The combined effect of these procedures, and the inputs they require, is to raise production costs above the level of traditional systems. In the 1970s, agencies like USAID promoted the conversion of shade coffee plantations to sun plantations, in response to fears about coffee rust, a fungal disease. The argument for switching to high-tech production was that if the coffee tree leaves remained dry, the fungus would not grow, since it can only survive in a humid environment. Yet over most of Central America, the fungus has not caused the problems anticipated. This is very probably due to the existence of a dry season and the high altitudes as well as cooler temperatures, conditions that inhibit—rather than promote—the disease.

Source: Perfecto et al. (1996) and Harner (1997).

However, as Map 3 illustrates, the dwindling forested tracts and the coffee-producing areas alike are facing permanent deforestation driven by population settlement patterns (the population is concentrated in the southwest of the country), economic growth patterns that are transforming the current use of agricultural land, and destructive subsistence practices driven by the dynamic of rural poverty.

Map 3
El Salvador: Forests, coffee plantations and deforestation in the 1990s



The territories experiencing the main processes of urbanization coincide with the main ground water recharge zones. The accelerating process of urbanization in the San Salvador metropolitan area clearly reflects this relationship: In addition to stepping up the demand for land and eliminating remnants of natural forests and coffee-producing areas, it has greatly limited the local water supply alternatives. Water is increasingly being extracted elsewhere to satisfy the growing urban demand. Areas of medium and high infiltration, many of which coincide with areas in the highlands of the central volcanic range, are where the majority of coffee plantations were established. Areas of lower permeability are also found in the northern highlands which, unlike the south corridor, lack the permanent vegetation cover. This makes them susceptible to severe degradation processes driven by subsistence agriculture and extensive cattle ranching, which have not adopted conservation practices for sustainable management of surface watercourses.

In short, not only have economic and social impacts been felt from the conversion of shade coffee-producing areas, but the changes in the use of coffee-producing land have reduced the capacity of the land to control and channel water into local aquifers. The conversion of coffee-producing land, reinforced by this crop's poor viability (particularly lowland coffee cultivated near urban settlements) and the rise in land prices driven by urban needs, will continue to decrease the capacity of these territories to provide themselves with environmental services as basic as water.

In the absence of a land management structure and environmental land use criteria, objectives which go far beyond environmental management, it is critical to re-evaluate the importance of the zones that play a vital role in providing water to the urban centres. Given the additional fact that the country's energy system—derived largely from hydroelectric generation—depends on agro-ecological conditions in the high-altitude watersheds where the dams are located, the necessity of transforming agriculture and ranching practices in these territories becomes evident. Ensuring the sustainability of hydroelectric sources requires recognizing the importance of this region's highlands—which make up a considerable share of the watersheds used for existing and planned reservoirs—and incorporating their use (agricultural, ranching, agroforestry) into a system that can reverse the destructive processes. The implications for processes of erosion and for the sustainability of the country's hydroelectric generation make this extremely important.

In conclusion, a process to regenerate the vegetation cover by changing agriculture and ranching practices, particularly in the north, requires an appropriate strategy and a mobilization of resources, if the country is to obtain sustainable environmental services for its development and a sustainable livelihood for the rural population living in these areas.

3. Shade-Grown Coffee and Global Environmental Services

In addition to the hydrological importance of El Salvador's coffee plantations, they provide environmental services of national, and indeed global, significance, including biodiversity conservation and carbon sequestration. Although, like water, none of these services has been recognized or been given market value, a number of initiatives are seeking to introduce incentive schemes which they hope to see realized through overseas marketing. Of note here is the opportunity of increasing the productivity and sustainability potential of the agricultural sector in general and coffee in particular through agro-environmental production. Indeed, the emerging global environmental service markets are an ideal stimulus for a much-needed process of extensive revegetation in the country. The aforementioned cases of carbon sink trading and biodiversity-friendly production are concrete opportunities to broaden the agricultural sector beyond its traditional focus.

3.1 Shade-grown Coffee and Biodiversity Conservation

The proposal on biodiversity conservation in coffee plantations has its roots in the country's environmental actions and commitments, which in turn have a regional and global frame of reference. With respect to biodiversity conservation, El Salvador has elaborated a land use proposal, falling within the framework of the Mesoamerican Biological Corridor project. The project's aim is to concentrate national efforts on biodiversity.[11] With this project, El Salvador is aiming not only to encourage the preservation of representative samples of ecosystems, but also to include biological corridors in the mangrove zone; in regions under permanent cultivation of national significance (such as coffee plantations), in water catchment areas (such as the country's lavas and sandy soils), and in fragile zones requiring protection (such as the upper Lempa River basin) (CCAD-SEMA, 1996).

Within this framework, El Salvador is implementing a GEF-supported pilot project whose purpose is to maintain and improve coffee plantations that serve as habitats for many species. According to the project's reasoning, a strategy of establishing protected areas is insufficient for preserving biodiversity,

[11] El Salvador has finished developing a national biodiversity strategy in response to the first commitment acquired by all governments that signed and ratified the Biodiversity Convention. This strategy constitutes the general framework for the country's actions on biodiversity conservation and sustainable use.

given the shortage of natural areas in El Salvador. What is required is a process to restore degraded land and expand species conservation areas. Coffee plantations are an excellent opportunity for combining conservation efforts with the logic of coffee production. By their nature, coffee plantations are important habitats for many species, particularly local and migratory birds (see Sidebar 3). Moreover, the GEF regards this project as an opportunity to gather experience under the aegis of the Mesoamerican Biological Corridor for replication and extension to conservation and sustainable use of biodiversity in Central America.[12]

Beyond the scope of this medium-term project, national efforts are continuing to gather technical, economic and marketing experience which contribute to: i) expanding coffee-producing zones using practices that do not harm biodiversity; ii) establishing a biological corridor of habitats formed by shade coffee plantations to connect the El Imposible and Los Volcanes areas,[13] and iii) creating incentives for biodiversity conservation by creating a category of coffee for export that is recognized as harmless to El Salvador's biodiversity. To achieve these results, the project includes steps to strengthen extension services, the creation of an eco-labeling program to identify biodiversity-friendly coffee, an awareness campaign on this product as a key element in foreign marketing efforts, and a system of biological and socioeconomic monitoring.[14]

In institutional terms, this project illustrates how, with reference to the regional and global environmental agreements and commitments, the Salvadoran coffee-growing sector has identified an economic potential that was unexploitable within the framework of traditional coffee transactions. The emergence of an incipient national environmental management framework, arising largely from the commitments under the Biodiversity Convention, has led to the elaboration of an original project based on the comparative advantages of coffee forests. In fact, unlike other countries in the region that still enjoy significant forested regions, El Salvador is forced to go beyond a socioeconomic vision and to view its coffee plantations in strategic terms. The link between the biodiversity-friendly coffee project and the Mesoamerican Biological Corridor project are geared to accessing resources from the global environmental institutional framework (particularly the GEF) which would otherwise have been unobtainable. The potential access to environmental service markets driven by a willingness to pay for biodiversity conservation has highly relevant implications for expediting the implementation of payment for environmental services and making it a fundamental component of a revegetation strategy (see Barry, Cuéllar and Herrador, 1997). Such a strategy is urgently needed in this country, since the coffee forests, which constitute a more comprehensive system, socially and technically speaking, can have a crucial positive impact on the rural poor and on the sustainable supply of environmental services both domestically and internationally.

[12] The technical criteria that have determined the project's territorial form basically refer to: i) coffee forests located in the Mesoamerican Biological Corridor identified for El Salvador; ii) a minimum of 10 native tree species, each with a minimum density of one per manzana of coffee farm; iii) the shade must cover a minimum of 40% of the ground homogeneously throughout the farm; iv) a minimum of 70% of the shade trees must be evergreen (GEF, 1998).

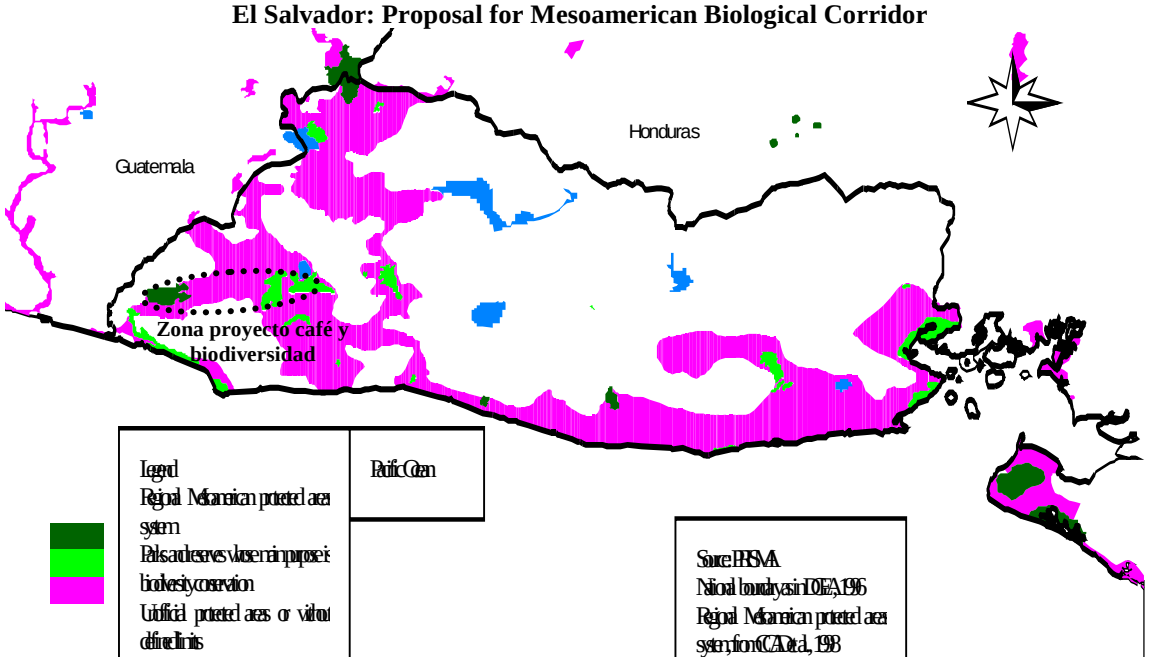
[13] Under the terms of the project, the corridor would cover approximately 75,000 ha, and has been identified as one of the most important due to its biological diversity, as well as being a strategic link in the Mesoamerican Biological Corridor.

[14] Coffee production and processing costs will continue being bankrolled by the producers, beneficiaries and the banking system under the existing arrangements. These are considered to be basic costs that are not funded by the project.

Sidebar 3
Biological Corridor, Shade-Grown Coffee and Migratory Birds

Studies have identified 509 bird species in El Salvador, 310 of them resident in neotropical zones. Some 128 bird species live exclusively in forest habitats, and the majority of them are found in shade-grown coffee plantations. For these species, shade-grown coffee plantations are important high-altitude migration corridors. Two of these species are considered endangered and 24 threatened on a worldwide scale. Thus, the improvement and protection of the forested habitat in El Salvador would benefit a large proportion of endangered bird species living solely in that environment. In addition, more than 420 bird species migrate from North America to the tropics, and many of them are considered endangered due to habitat destruction. In El Salvador, 193 migratory species have been identified. The country's geographical position makes it an important strategic point for these species, since populations from both eastern and western North America converge here. The majority of migratory land birds only reach Central America and the Caribbean. Since most of them are consistent in their choice of wintering grounds, it is improbable that the populations migrating through El Salvador will find other habitats, especially given the intense deforestation that has taken place in Central America. Approximately 40 migratory land birds visiting El Salvador are considered to be of world interest by Partners in Flight, an international cooperation program made up of academics, governmental and non-governmental organizations. In short, El Salvador's shade coffee plantations are crucial for these migratory species. Given the extreme deforestation in south Mexico and northern Central America (where most migratory bird species winter), scientists believe that the coffee plantations are as important for migratory land birds as the rest of the tropical forests. Consequently, the maintenance and/or expansion of shade-grown coffee in El Salvador would represent a significant contribution to a biological corridor for migratory species. According to the project's proponents, given the extreme degradation that has occurred in El Salvador, shade-grown coffee is the best opportunity to preserve biological diversity of national and world interest on a reasonable scale.

El Salvador: Proposal for Mesoamerican Biological Corridor



Source: From Komar (1998).

3.2 Shade Coffee Plantations as Carbon Sinks

Among Central American nations, El Salvador is in last place in accumulating joint implementation experience.[15] Paradoxically, it is the country that is most urgently in need of measures to reverse environmental degradation. This is a fundamental challenge that requires a systematic framework within which to organize national opportunities and priorities. Identifying strategies that significantly increase the country's vegetation cover, particularly in degraded areas, is a key element that should in turn form part of a much more comprehensive framework capable of estimating and organizing the various financing sources and mechanisms needed to make environmental services possible. These services are not only critical to the country's development, but can also be marketed globally. With the Clean Development Mechanism now in operation, Central America has accumulated a wealth of experience in carrying out AIJs.[16]

Therein lies a significant opportunity for shade-grown coffee. As part of the agro-environmental sector, it is ideally suited to produce value for carbon sink transactions. In this light, the Kyoto Protocol can indeed give impetus to a revegetation process to create a more extensive and permanent vegetation cover for the country. Beyond contributing to emission reductions and increasing greenhouse gas sequestration capacity, this will help to provide the environmental services required for domestic development. Through mechanisms such as those stemming from the Kyoto Protocol, this type of effort distributes opportunities regionally so as to maximize the social, economic and environmental impacts.

The opportunities to promote revegetation—such as shade-grown coffee, which significantly increases biomass and hence the carbon sequestration capacity of Salvadoran agriculture—are closely tied to the scope of the climate change negotiations. Consequently, major efforts are being made to increase understanding of the relationship between shade coffee plantations and carbon sequestration. In the Salvadoran case, it should be noted that in addition to natural woodlands, regeneration options include buffer zones around natural areas; land undergoing natural regeneration; agroforestry systems (e.g., shade-grown coffee); and pastoral-agroforestry systems, which are not only more socially inclusive, but also exhibit a not insignificant carbon sequestration potential.

In Guatemala, TechnoServe is cooperating with the Solar Foundation and Winrock International Institute for Agricultural Development in a pilot project to develop methods for measuring carbon sequestration in shade coffee plantations (TechnoServe, 1998). Likewise, the Solar Foundation is supervising a study at a coffee cooperative to measure the capacity of coffee plantations to absorb carbon dioxide. The study's findings will contribute to the development of a model for measuring the potential environmental offsets represented by coffee production. It is hoped that the findings will form the basis of technical proposals for submission to the USIJI as joint implementation projects.

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[15] In El Salvador, the National Climate Change Communication project has been in progress since September 1997. This project aims to empower the country to fulfill its initial commitments under the Framework Convention on Climate Change. It is hoped to produce a national greenhouse gas inventory (by source and sink); a study of the country's vulnerability to the effects of climate change; a national mitigation and adaptation plan; the institutional arrangements necessary for climate management and a public awareness and education program about the problem of climate change. A Clean Development Office under the Ministry of the Environment and Natural Resources has also been set up to promote and facilitate the execution of projects to reduce, avoid or sequester greenhouse gases.

[16] Although there is an emphasis on carrying out projects that maintain and/or augment CO_2 fixation capacity, an attempt has also been made to combat the global warming problem from the emissions side with projects that involve the construction and operation of electricity generation plants from renewable resources (water, wind, thermal and biomass sources), to displace electricity generation based on fossil fuels and reduce the energy industry's emissions accordingly.

The opportunities offered to El Salvador by the prospect of emissions trading are the driving force behind revegetation proposals. Despite being tied to incentives to sell environmental services, various attempts to reform the Salvadoran forestry industry have not had a major impact. But other revegetation strategies involving the sale of environmental services are making greater headway. PROCAFE is developing a proposal to increase the land area under shade coffee cultivation to about 100,000 manzanas (175,000 acres) in four years. It estimates that this would not only significantly increase the crop's contribution to the generation of foreign exchange, tax revenues and employment, but would also have direct impacts on soil and water conservation and carbon fixation—particularly given the potential economic value to be derived from the sale of these services.

Although the technical feasibility studies on which to base the proposal have not yet been done, its proponents adduce Costa Rican estimates on the value of environmental services, carbon sequestration in particular (see Table 4), to validate the potential of new coffee cultivation.

Table 4
Costa Rica: Estimated value of environmental services provided by forest plantations

Type of benefit	Amount (US$/ha)
Water supply	8–16
Lost productivity of hydroelectric dam.	15–25
Agricultural land preservation	2–4
Flood control	4–8
Carbon sequestration	40–100*
Ecotourism	6–12
Firewood production	10–20
Timber production	10–20
Biodiversity conservation	4–10

* Value of sequestered carbon estimated at US$10/ton.
Source: PROCAFE (1999).

This proposal for expanding the coffee-producing zones has the potential to position the need for revegetation much more strategically. That is, the potential exists for a process of participation and dialogue among various stakeholders, through the introduction of criteria which, in addition to increasing agricultural production and environmental services, represent an opportunity to fight rural poverty, above and beyond the employment and income generation objectives. This depends on a territorial organization of production (of coffee and environmental services) that maximizes the positive impacts; for example, the use of watersheds by various stakeholders will have to be controlled by establishing the requisite institutional arrangements.

4. Shade-Grown Coffee, Trade in Global Environmental Services and National Sustainability

The marketing initiatives for environmental services associated with biodiversity conservation and carbon sequestration in coffee plantations are underpinned by the progress made by the environmental agenda. Both initiatives are linked to opportunities arising from regional and national commitments under biodiversity and climate change agreements. In the absence of a domestic environmental management framework, especially the necessary policy instruments, the possibilities opened up by the mobilization of financial resources constitute important points of departure in moving towards more environmentally efficient productive processes. Nevertheless, it is necessary to promote a management strategy which also identifies and implements financial resource-mobilizing mechanisms in the form of payment for non-tradable environmental services—such as water—that are critical to the country's development. In the Salvadoran case, trade in environmental services is developing much more rapidly through the search for new foreign markets and the incipient creation of an emissions market under the auspices of the Kyoto Protocol.

In regard to biodiversity conservation, the inroads made by biodiversity-friendly coffee into new markets will depend more on the willingness-to-pay of biodiversity conscious consumers, since the climate change negotiations and the implementation of the Clean Development Mechanism are ambiguous as to whether or not shade-grown coffee plantations qualify as sinks under the emission trading structure. The implications of coffee plantation destruction and firewood extraction for avoided emissions (carbon liberation) can be profitably invoked in this context, but beyond that, El Salvador needs to make decisive progress in other directions:

- While the proposals and projects on shade-grown coffee are an important territorial approach to providing the environmental services required domestically, they are insufficient to ensure that the environmental degradation will be reversed. This is particularly true in the north of the country, which is already being used to meet industrial and residential water demands and offers the best hydroelectric potential.
- The mechanisms arising from the emerging trade in global environmental services must be augmented by domestic management tools that maximize the positive environmental impacts. For example, in El Salvador, there is a need to develop and apply quality standards and regulations to production processes and discharges generated by coffee processing plants—a major source of water pollution. Voluntary mechanisms such as eco-labeling have the capacity to modify productive processes in a way that domestic environmental policy has thus far been unable to do.
- Environmental service markets lend themselves to inclusion in poverty-reduction strategies. This is all the more relevant to rural areas, where the relative absence of valid poverty reduction proposals (outside of non-agricultural rural job creation) is noteworthy. Considering the need to reverse the processes of land degradation in the northern highlands, the sale of environmental services generated there can become part of a sustainable livelihood of rural producers. This change requires a shift towards an agroecological production orientation, wherein food production and soil and water conservation on each farm would be combined with the production and sale of environmental services in demand both nationally and internationally
- Trade in environmental services creates opportunities to coordinate domestic policies for various sectors toward a system of environmental management under which policies on water, energy, agriculture and, of course, the environment, are elements in a strategic management system capable of turning around the process of environmental degradation taking place in the country.

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