Global Environment Facility

GEF

MOHAMED T. EL-ASHRY
CHIEF EXECUTIVE OFFICER
AND CHAIRMAN

June 22, 2000

Dear Council Member:

I am writing to notify you that we have today posted in the GEF's website at www.gefweb.org, a medium-sized project proposal entitled *Nicaragua: Renewable Energy and Forest Conservation: Sustainable Harvest and Processing of Coffee and Allspice.* The GEF will contribute $750,000 towards a total cost of $2.169 million.

The project will promote the use of renewable energy in the development of biodiversity-friendly agro-industrial processes in rural Nicaragua that will provide significant increases in revenue through value-added processes and direct exportation and marketing of coffee and processed allspice. The project will remove barriers to successful implementation of renewable energy technology for these agro-industrial applications, thereby reducing CO_2 emissions and eliminating a significant contribution to deforestation – the use of wood to dry the coffee and allspice harvest. The project will also reduce the pressure on natural habitats in the BOSAWAS Reserve through strengthening opportunities for sustainable land use management in its buffer zone.

The project proposal is being posted for your information. We would welcome any comments you may wish to provide by July 12, 2000, in accordance with the procedures approved by the Council.

If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to down load the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

P. G. Bass - Guest

for Mohamed T. El-Ashry
Chief Executive Officer
and Chairman

cc: Alternates, Implementing Agencies, STAP

THE WORLD BANK/IFC/M.I.G.A.

OFFICE MEMORANDUM

DATE: May 4, 2000

TO: Mr. Kenneth King, Assistant CEO,
GEF PROGRAM COORDINATION

FROM: Lars Vidaeus, GEF Executive Coordinator

EXTENSION: 3-4188

SUBJECT: **GEF Medium-Sized Project (MSP)**
NICARAGUA: Renewable Energy and Forest Conservation: Sustainable Harvest and Processing of Coffee and Allspice

1. Please find attached the Project Brief for the above-mentioned Medium-Sized Grant received from the Mesoamerican Development Institute (MDI). The project has been endorsed by the GEF national operational focal point (see letter, also attached).

2. In accordance with operational guidance for approval of Medium-Sized Projects, we are submitting this project brief to the GEF Secretariat for action by the Chief Executive Officer (CEO). We are simultaneously circulating copies to UNDP/GEF, UNEP/GEF, STAP, and the FCCC and CBD Secretariats for comments within 15 working days, or by May 25, 2000.

3. We look forward to receiving the GEF Secretariat's guidance on the next processing steps for this Medium Size Project by June 8, 2000 (if not before). Thank you and best regards.

Copies:
R. Asenjo, UNDP (Fax:212-906-6998)
A. Djoghlaf, UNEP (Nairobi) (Fax: 254-2-624-041)
M. Gadgil, STAP (Fax: 91-80-334-1683 or 91-80-331-5428)
M. Griffith, STAP Secretariat (Nairobi) (fax 254-2-623-140)
H. Zedan, CBD Secretariat (Fax: 1514-288-6588)
C. Parker, UNFCCC Secretariat (Fax: 49-228-815-1999)

Messrs./Mmes. M. Cackler (LCC2C); T. Wiens, T. Lovejoy, P. Agostini, C. Kimes, T. Bradley (LCSES); W. Vergara (LCSES/QAT); G. Castro, M. Sharma, R. Khanna, D. Aryal (ENV); M. Montiel (LEGLA).

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NICARAGUA

Renewable Energy and Forest Conservation: Sustainable Harvest and Processing of Coffee and Allspice

GEF Medium-Sized Project

Project Brief

May 2000

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TABLE OF ACRONYMS

ABC	Atlantic Biological Corridor
BID	Interamerican Development Bank
CBC	Canadian Broadcasting Corporation
CCAD	Central American Commission on Environment and Development
CIDA	Canadian International Development Agency
CNB	National Commission of BOSAWAS
GEF	Global Environment Facility
GTZ	German Agency for Technical Cooperation
IDR	Institute for Rural Development, Managua (financing partner for equipment)
IIZ	Institute for International Cooperation (financing partner for equipment)
PCAC	Campesino to Campesino Program, Implementing partner for the project. Campesino to Campesino is a program of the National Farmer's and Cattle Rancher's Union.
PFA	Frontera Agricola Program, housed in the Ministry of Natural Resources and the Environment, providing assistance in biological monitoring and development of allspice nurseries.
POSAF	Program Socioambiental y Desarrollo Forestal
MARENA	Ministry of Natural Resources and the Environment
MDI	Mesoamerican Development Institute, executing organization for the project
NREL	National Renewable Energy Laboratory, Boulder, Colorado, USA
SCAA	Specialty Coffee Association of America
SOCED	Ecumenical Cooperative Development Society (financing partner for equipment)
UNAG	Unión Nacional de Agricultores y Ganaderos

Renewable Energy and Forest Conservation: Sustainable Harvest and Processing of Coffee and Allspice

Medium-Sized Project Brief

PROJECT SUMMARY

1. Project name: Renewable Energy and Forest Conservation: Sustainable Harvest and Processing of Coffee and Allspice	**2. GEF Implementing Agency:** The World Bank
3. Country or countries in which the project is being implemented: Nicaragua	**4. Country eligibility** Nicaragua ratified the UN Framework Convention on Climate Change on October 31, 1995. Nicaragua ratified the Convention on Biological Diversity on November 25, 1995
5. GEF focal area(s): Climate Change and Biodiversity	**6. Operational program/Short - term measure:** This proposal falls within: Operational Programs #6: promoting the adoption of renewable energy by removing barriers and reducing implementation costs (Component 1-2-3-4). Operational Program #3: promoting conservation of forest ecosystem (Component 4).
7. Project linkages to national priorities, action plans, and programs: Under the Central American Alliance for Sustainable Development (June 1997) the President of Nicaragua adopted the Mesoamerican Biological Corridor as an instrument for planning and prioritizing investments. The BOSAWAS National Reserve of Natural Resources had been created six years earlier (Decree No. 44-91 issued on October of 1991). The Regulations for Protected Areas (issued by Decree 14-99 on March 2, 1999) requires all protected areas to issue a management plan. The areas targeted by this project are identified as priority buffer zones under the management plan that is currently under consultation. The project is also consistent with the promotion of environmentally sound practices of export products, as stated in the Green Seal Decree (Decree 71-99 issued on June 25, 1999) and it is also consistent with the biodiversity and forest conservation policies stated in the General Law for the Environment and Natural Resources (L. 217 from March 26,	

1996), its regulation (Decree 9-96, of July 25, 1996), the Nicaraguan Strategy for Conservation and Sustainable Development (ECODESNIC), Environmental Action Plan for Nicaragua (PAA-NIC) and the Forestry Action Plan (ECOT-PAF).

The project is complementary with several internationally funded projects in the BOSAWAS region: the European Union financed Frontera Agricola Program to promote sustainable development and slow the advance of the agricultural frontier; the German Agency for Technical Cooperation (GTZ) program to seek strategies for the reserve involving sustainable productive activities; and the US Agency for International Development (USAID) management program for the protection of the BOSAWAS Reserve.

8. GEF national operation focal point and date of country endorsement:
Block A Endorsement -Garcia A. Cantarero, GEF Operational Focal Point --- Ministry of Natural Resources and the Environment, 26 October, 1998.
Project Brief Endorsement- Garcia A. Cantarero, GEF Operational Focal Point --- Ministry of Natural Resources and the Environment, 14 February, 2000.

9. Project rationale and objectives:	**Indicators:**
The development objective of the project is to: 1. Promote the use of renewable energy in the development of biodiversity friendly agro-industrial processes in rural Nicaragua that will provide significant increases in revenue through value-added processes and direct exportation and marketing of coffee and allspice processed.	1.1 Increase in revenues (50%) for the cooperatives through the added value of cost-effective solar drying systems and the direct export and marketing of biodiversity friendly coffee and allspice essential oil (sustainably produced and solar processed) in the international specialty market. 1.2 Percentage of the 54 shareholders that remain anchored on their original parcel by third year of project (85%).
The global environmental objectives are to: 2. Remove barriers to successful implementation of renewable energy technology for these agro-industrial applications, thereby reducing CO2 emissions and eliminating a significant contributor to deforestation: the use of wood to dry the coffee and allspice harvest (OP#6).	2.1Reduction of CO2 emissions in target zone through the use of solar-based drying systems as compared to baseline. Over life of project, the combined drying capacity represents estimated savings of 222 hectares of clear-cut forest over conventional dryers, with a

	corresponding 80,994 MT reduction of CO2 emissions. 2.2 Solar coffee drying could easily be expanded to by a factor of 10 in six years to the nearly 100 coffee producing cooperatives in the areas surrounding the three coffee target sites, providing a reduction of CO2 emissions of nearly 270,000 MT per year.
3. Reduce pressure on the natural habitats in the BOSAWAS Reserve through strengthening opportunities for sustainable land use management in its buffer zone (OP#3).	3.1 Deforestation rate in the BOSAWAS Reserve lowered as a result of reduced extraction of trees to fuel allspice and coffee processing. 3.2 For life of project, up to 126 ha added from 15,000 new allspice trees, 1,619 young allspice trees, as well as new tempate, citrus fruits and other appropriate species, corresponding to an estimated 45,513 MT carbon sink. 3.2 For future expansion in the fourteen communities near the allspice target site, up to 699 ha. added from 50,000 new allspice trees as well as additional tempate, citrus fruits and other appropriate species, corresponding to an estimated 84,286 MT carbon sink over the next three to six years.

10. Project outcomes:	**Indicators:**
1. Information and capacity barriers removed in pilot zone through completion of technical training and capacity building program.	1.1 Ability of trained operators to operate and maintain dryers and processing equipment, as measured by processing throughput. 1.2 Ability of trained installation and repair team to install and service systems without outside assistance by year three. 1.3 Ability of trained managers and administrators to manage the enterprise without outside assistance by year three.
2. Revenues for producers increased and market for solar processed coffee and allspice essential oil on the international market expanded.	2.1 Increase in revenue for coffee and allspice producers through the value-added of processing, and direct export and marketing of biodiversity friendly (shade grown and solar processed) coffee and allspice essential oil. Increases of revenue in excess of 50%. 2.2 Ten to sixteen containers of coffee exported and marketed as solar-dried or café solar®[1]; one thousand pounds of allspice essential oil extracted from leaves and berries.
3. Renewable energy technology for coffee and allspice drying with sufficient technical training and support services introduced in the BOSAWAS buffer zone.	3.1 Installation of ten solar drying systems and related processing equipment for a combined drying and processing capacity of 30,000 qq per season (coffee) and 2,000 lbs. per season (allspice essential oil) by the third year of project.

[1] Café Solar® is a trademark of the Mesoamerican Development Institute used to promote the market for coffee processed using solar/biomass coffee drying systems.

4. Less people engaged in unsustainable natural resource uses in the BOSAWAS Reserve.	4. A decrease in the number of people that are engaged in destruction of BOSAWAS forest for fuel to process coffee and allspice.
5. Greater knowledge of the benefits to the climate and biodiversity from sustainable production systems and of the relationship of allspice habitat to biodiversity through implementation of the project's monitoring and information system.	5.1 Annual reports issued by monitoring and information system during the life of the project. 5.2 Relationship of allspice habitat and biodiversity measured in both the proposed sustainable production system and in its natural habitat in the buffer zone and Reserve.
11. Planned activities to achieve outcomes:	**Indicators:**
1. Develop and implement capacity building/training /outreach program to support the installation, operation, maintenance and repair of solar and related equipment, as well as quality control and export issues.	1.1 Forty dryer operators trained by third year; ten member core team from Campesino a Campesino to be trained at the MDI/Montes de Oro Field Research and Training Center in processing, quality control, and export issues in first year of project; twenty-one trained in system installation and maintenance, fundamentals of solar thermal and photovoltaic systems in first year of project; fourteen trained in management and administration of enterprise by second year of project. 1.2 Fifty-four harvesters (shareholders) trained; fifty-four shareholders trained in mixed-use agro-forestry, nursery, and planting

	nursery, and planting techniques. 1.3 Number of demonstration events for members, cooperatives, and producer associations throughout the region (at least six per year).
2. Implement marketing program to increase demand for coffee dried using renewable energy technology.	2.1 Development and distribution of marketing materials for participating importers/roasters and potential participants (including pamphlets, video, ad copy, and content for web sites); ten to sixteen containers of coffee exported and marketed as Café Solar®; five initial importers/roasters supplying the coffee; fifty retail outlets offering the coffee for sale by the second year of the project; twenty training/educational presentations for marketing managers, importers, and shop proprietors by the third year of the project. 2.2 Marketing materials developed for herb and essential oil industry participants (including pamphlets, video, ad copy, and content for web sites); five suppliers and companies purchasing allspice products by end of third year; One thousand pounds of allspice essential oil exported by first year of plant operation, year two of the project.
3. Final configuration, installation and operation of allspice processing plant and dry beneficio using solar/biomass systems, allowing for future expansion, for target cooperatives.	3.1 Dry processing plant designed for coffee, operation plan completed first six months of project, as well as three-year plan to meet increased

	production. 3.2 Allspice processing system design, configuration, and operational plan completed during first year of project.
4. Land Use and Socio-Economic Monitoring.	4.1 Implementation of land use and socio-economic monitoring, including: amount of coffee and allspice essential oil processed and exported; corresponding estimated reductions in CO2 emissions through the use of the solar drying systems; revenues and profits; employment opportunities provided by the program; and employment opportunities for women; ability of project to anchor participants to their parcels. 4.2 Implementation of biological monitoring and evaluation of allspice productive system including: change in allspice habitat as compared to baseline; and assessment of biodiversity benefits over baseline. Assessment of natural allspice habitat in terms of contribution to biodiversity and understanding of the ecology of the allspice habitat.

12. Estimated budget (in US$):

Co-financing will cover the purchase and installation of drying and processing equipment, as well as the purchase of solar-dried coffee on the international specialty coffee market and allspice essential oil for export. GEF financing will focus on barrier removal, primarily through technical assistance, training and capacity building activities, as well as, training activities for sustainable extraction and production methods, habitat conservation awareness, and habitat monitoring program.

GEF:	$ 725,000
Co-financing:	$1,444,000
MSP TOTAL:	$ 2,169,000
GEF TOTAL (MSP + PDF A)	$750,000

13. Information on project proposer:

The Mesoamerican Development Institute (MDI) is a nonprofit organization working to promote renewable energy technology for productive, highly-value-added applications in rural Mesoamerica in collaboration and partnership with the Unión Nacional de Agricultores y Ganaderos (UNAG) program, Campesino a Campesino (PCAC), a horizontal technical assistance and training program with extensive field experience working in the target region, specifically, cooperatives in the BOSAWAS Reserve Buffer Zone.

MDI has developed solar/biomass drying systems with support from the National Renewable Energy Laboratory (NREL) and has conducted pilot marketing projects for solar-dried coffee through an alliance of importers/roasters in the specialty coffee industry. MDI jointly operates the MDI/Montes de Oro Research and Training Center in Miramar, Costa Rica, with cooperative Montes de Oro, a cooperative of over 500 families incorporating sustainable processing methods including solar/biomass coffee drying.

The Campesino a Campesino Program, with offices in Managua, Matagalpa, Boaco, El Cuá and Siuna, is dedicated to productive innovation, community participation, and the protection of natural resources. The program seeks to assist a growing network of campesinos through a process of innovation and horizontal transfer.

MDI will be the executing organization for the project and will administer GEF funding. UNAG, through its Campesino a Campesino Program, will serve as counterparts in the implementation of the project.

Contact information: Raúl Raudales (978) 937-3460 (MDI); Byron Corrales (505) 222-2235 (PCAC)

14. Information on proposed executing agency (if different from above): MDI, as outlined above.

15. Date of initial submission of project concept: 14 April 98

INFORMATION TO BE COMPLETED BY THE IMPLEMENTING AGENCY

16. Project identification number: GM-P061316

17. Implementing Agency contact person:

Christine Kimes, Global Environment Coordinator
tel: (202) 473-3689 fax: (202) 614-0087 email: ckimes@worldbank.org
Paola Agostini, Task Manager
tel(39) 06570 54325 fax: (39) 06570 54657 email: pagostini@worldbank.org

18. Project linkage to Implementing Agency program(s):

The project is consistent with the World Bank's Country Assistance Strategy for

Nicaragua, which identifies the destruction of forests as an issue of major importance for the country, and gives top priority to improving natural resource management.

Currently, the World Bank has three projects related to this proposal: (i) a Rural Municipalities Project which aims to reduce rural poverty and improve natural resources management; (ii) an Atlantic Biological Corridor Project (GEF), which aims to promote the integrity of a biological corridor along the Atlantic slope of Nicaragua by ensuring the conservation and sustainable use of biological resources in this region; and (iii) a Sustainable Forestry Investment Promotion Project which aims to improve local capacity and develop alternatives to address long term forestry issues in Nicaragua.

The proposed MSP is located in a part of the Atlantic slope which is not included in the on-going ABC project. MSP activities would therefore not duplicate on-going project activities, and would complement efforts under the Corridor project by testing new approaches addressing root causes of habitat loss in the Corridor.

The proposed project would also strongly support objectives of the Rural Municipalities Project and the Atlantic Biological Corridor. Within this strategy, the introduction of renewable energy to promote the reduction of carbon dioxide emissions and reduce pressure on forests through sustainable extraction and processing of highly value added products (coffee and allspice) are singled out as high priorities for the nation because of their many biodiversity and many other environmentally positive aspects. This project also supports the ongoing efforts of the Comision Nacional de BOSAWAS (CNB) to preserve the biodiversity of the reserve and improve the livelihoods of the communities, which is chaired by the Minister of Natural Resources and the Environment.

PROJECT DESCRIPTION

PROJECT RATIONALE AND OBJECTIVES

The BOSAWAS is one of the largest and last remaining contiguous rainforest in the region and is an important component of the Mesoamerican Biological Corridor (See Map in Annex I). The 800,000 hectare buffer zone contains habitats recognized for their biological importance, including mid-altitude humid forests and populations of regionally endangered species. Many rare and endangered species exist, as well as many uncommon species. The rare and endangered mammals include tapir, giant anteater, ocelot, jaguazundi, and margay. Rare and endangered birds include harpy eagles, king vultures, great green macaw, scarlet macaw, and great caragon.

The BOSAWAS region is threatened by current patterns of frontier development that are unsustainable, non-economic, and the source of increasing social and environmental problems. The buffer zone of the BOSAWAS, and in particular, the area of the target project, is currently experiencing the highest rate of deforestation in Nicaragua, over 200 hectares per day due to an expanding agricultural frontier. The issue of preserving the remaining forest habitat in this region is increasingly prominent in national policy dialogue.

A key aspect of the project would be to facilitate the adoption of renewable energy technologies for agro-industrial processing, which would reduce reliance on the use of firewood The proposed MSP would also reduce pressure on the natural habitats in the BOSAWAS Reserve through strengthening opportunities for sustainable land use management in its buffer zone. Adoption of renewable energy technologies in the small-scale rural economy of BOSAWAS is constrained, however, by a number of institutional, technical, informational and financial barriers.

The proposed MSP would address these barriers in the coffee and allspice markets. The project allows for the installation of decentralized, off-grid processing plants (beneficios) for three clusters of coffee cooperatives and one allspice-producing cooperative in the BOSAWAS Reserve buffer zone. The project would provide the capacity building and technical assistance necessary for the installation and maintenance of the equipment, as well as training and assistance with quality control, operation, and export issues. The project would also allow the cooperatives to connect directly with distributors and importers/roasters that are seeking new sources of solar-dried coffee and allspice essential oil processed using renewable energy. Finally, the project would address financial barriers by matching the cooperatives with co-financing organizations that desire to foster rural development and sustainability.

In broad terms, the proposed MSP provides incentives for campesinos to actively promote biodiversity in their communities and the concept of the “cultura productiva campesina,” a new mentality, which combined with the proper tools—renewable energy technology, technical training, and access to credit—permits the campesino to transition to agro-industrialist and exporter of “high-value” products. The increased revenues and the development of community capital are the major social impacts of the project through

capture of value added, creation of production capacity, creation of local technical skill and knowledge base.

Specifically for coffee production, the MSP would provide the technical extension services needed to configure, install, maintain, and operate a decentralized dry beneficio using Solar/Biomass Coffee Drying Systems. This effort will provide processing capacity over the next three years for the following three communities of cooperatives: Cooperativa Agropecuaria de Servicios de Pequeños Productores de Café Peñas Blancas R.L. el Cuá Jinotega; Cooperativa Agropecuaria de Servicios de Pequeños Productores de Café R.L., Boaco; and Cooperativa Agropecuaria de Crédito y Servicios Solidaridad R.L., Aranjuez, Matagalpa.

The three coffee producing demonstration sites for this project consist of 1,500 small coffee farms of 0.5 to 5 hectares of organic and shade grown coffee. These sites provide habitat with a high degree of biodiversity in a region that is otherwise highly deforested. The area is known to provide winter habitat for the endangered Golden-cheeked Warbler (Dendroica chrysoparia)[2].

With respect to allspice production, the proposed GEF-financed activities would assist local communities to utilize renewable energy technologies to produce allspice and allspice essential oil from berries and leaves for a growing international market. The allspice-producing site chosen for this project, near the town of Siuna, is in a region with the highest deforestation rate in Nicaragua. The communities here are primarily involved in subsistence farming. Due to the fragile soil in this region, the crops are typically planted on recently cleared land, contributing to the advance of the agricultural frontier. During project preparation, fifty-four highly motivated members of this community organized to become shareholders in the new company Cooperativa Agropecuaria de Servicios de Extracción de Aceites Esenciales R.L., El Bálsamo. The officers were elected and bylaws adopted during a series of workshops. The new enterprise is now incorporated and has a small working capital fund with funds pooled from each member.

The combined area of parcels for the 54 shareholders is 1,708 hectares and the average parcel is 0.7 hectares, with 3.33 Mz of land planted with frijol abono and reserved for expansion of allspice and other appropriate species, including, cocoa, banana, musaceas, tempate, citrus fruits, and cinnamon. The number of producing allspice trees on the 54 parcels is currently 130 with an additional 1,619 young trees (less than six years) that will become productive in two to four years. Another 16,500 allspice trees are under development in the shareholder's nursery. (See Annex II for a detailed description of these shareholders.)

For both allspice and coffee, processing equipment and the base of expertise at each of the sites will serve as profit/demonstration centers that will encourage further dissemination of solar/biomass drying systems and methodology among other cooperatives and producer associations throughout the region. Particularly training materials, radio programs, and "campesino a campesino"visits will be promoted by the project to induce replication of this experience under the training component. There are potentially large audiences for

[2] Winter Habitat and Distribution of the Endangered Golden-cheeked Warbler, March 1999, Rappole, King, and Leimgruber, Smithsonian Conservation and Research Center, Front Royal, Virginia, U.S.A.

this outreach effort, For example, in Nicaragua there are nearly 43,000 small coffee producers and an additional 300 allspice producers near the pilot site with almost 9,500 additional hectares that could be used for production. (See Annex III for further information.)

The project falls within GEF Operational Program Six: promoting the adoption of renewable energy by removing barriers and reducing implementation costs (climate change), resulting in the introduction of Solar/Biomass coffee and allspice drying systems and related equipment; and within GEF Operational Program Three: promoting conservation of forest ecosytems through strengthening opportunities for sustainable land use management in the BOSAWAS Reserve's buffer zone and monitoring from the project startup the relationship between managing allspice trees in this forest ecosytem and the associated global biodiversity benefits inside and outside of the BOSAWAS reserve.

CURRENT SITUATION

1. Background

Within the BOSAWAS Reserve and its buffer zone, current coffee and allspice production processes are damaging to the environment and farmers capture only a small portion of the value-added from production. For coffee, the three cooperatives targeted for this proposed MSP sell their coffee in the highly perishable berry or wet pergamino stage. The coffee is transported to centralized wood-fired dryers in Matagalpa or Managua. Coffee drying, a highly energy-intensive process, is contributing significantly to deforestation. And with the potential to individualize the coffee and to sell directly to the international market for higher value forgone, the farmers are the lowest level of the value-added chain. The groups report prices ranging from 0.15 to 0.40 cents per pound in recent years. (See Annex IV for a detailed description of production of coffee.)

A similar situation exists for allspice (pimenta doica), which is indigenous within the BOSAWAS Reserve and its buffer zone. Currently, a small amount of allspice is harvested in the area and sold in Managua. Local extraction practices involve either cutting down the tree in order to pick the berries cheaply or severely coppicing the tree so that little of the crown remains. Using these methods, the tree is either destroyed or impaired, not bearing fruit for four to six years. The drying systems and processing equipment are energy-intensive. International markets exists for ground allspice used by the baking industry and domestic culinary and for high value-added products including essential oil for medicines, cosmetics and food preservation that are derived from the berries and leaves. Although allspice, and especially allspice essential oil, are products that command very high prices, the extractors sell the raw product at the lowest level of the value-added chain.

These market conditions for coffee and allspice are contributing to deforestation. In total, over 200 hectares per day of forests in the BOSAWAS buffer zone are lost due to an expanding agricultural frontier. One indicator of the lack of forest cover in this region is

rise in field rats that are devastating the area's crops. Nearly 50% of last year's standing crops were destroyed by rats. Experts believe the rise in the rat population is a direct result of the loss of forest habitat for the principal predators of the rats, such as owls and boa constrictors.

The adoption of renewable energy technologies would reduce demand for firewood while allowing small producers to capture the added value that processing and direct access to international markets provide. However, adoption of these technologies in this local economy is constrained by a number of institutional, technical, informational and financial barriers:

- Institutional barriers: There is no frame of reference for the transformation of the campesino, or small producer, to agro-industrialist. The ability to process either coffee or allspice requires capital investment, technical and managerial capacity, and entrepreneurial spirit. Unlike neighboring Costa Rica, with highly developed cooperative models with processing and export capability, the target cooperatives are organized solely as farmers of a raw product;

- Technical barriers: Lack of technical capacity to design and install solar drying systems and related processing equipment that match local conditions;

- Informational barriers: Lack of access to and experience with international markets and limited access to methodology and working models to promote the new concept of renewable energy technology for rural productive applications; and

- Financial barriers: Lack of available credit for small growers to purchase equipment and finance the harvest is a long-standing barrier.

2. Past Activities

A number of programs over the past five years have endeavored to grapple with different aspects of this situation:

a) *Institutional Barriers:* Over the past five years, MDI and Cooperative Montes de Oro have established the MDI/Montes de Oro Research and Training Center in Miramar Costa Rica (US$1,160,000). The Center is the only working demonstration site that incorporates renewable energy technology for rural productive applications. Representatives of the target participating cooperatives will receive training in the use of equipment and quality control and export issues, in this facility during project period.

In 1998, the Interamerican Development Bank (IDB) began administering a four-year Café Eco-Forestal program in Jinotega and including the target cooperatives in Aranjuez, Boaco, and El Cuá. The program aims to improve the quality of life for rural coffee farmers in the Northern watershed of Nicaragua by providing grants of US$950 per Mz (US$320,000 in the first two years) to introduce sustainable coffee production, including:

shade management, green and organic fertilizers, integrated pest management and related technologies to improve production and reduce water contamination.

The German Agency for Technical Cooperation (GTZ) is supporting the efforts of the Government of Nicaragua and the Comision Nacional de BOSAWAS (CNB) to protect and develop the BOSAWAS Reserve. The GTZ program (US$8 million 1995 through 1999) is devising concepts and long-term strategies in coordination with projects of other donors, such as the European Union, USAID, the Scandinavian countries, the Netherlands and Italy. The main objective is to develop the BOSAWAS Reserve in a manner that is socio-economically and ecologically sound, and above all, acceptable to the local population.

b) *Informational Barriers:* Past funding for marketing coffee produced using renewable energy technology includes funds spent between 1996 and 1998 on promoting the concept with members of the Specialty Coffee Association of America (SCAA) and conducting an initial marketing pilot study in which 30,400 lbs. of Café Solar® has been sold in coffee shops throughout New England and Toronto (US$150,000). As a result of this pilot, several importers are eager to import and market the coffee that will be produced with this project.

c) *Technical Barriers:* Past funding for these activities are funds spent by MDI and the National Renewable Energy Laboratory (NREL) outside Nicaragua to develop and test Solar/Biomass Drying Systems and related equipment, conduct research, analysis, and feasibility studies for these applications (US$615,000).

In addition, the GTZ program in BOSAWAS has been monitoring the current rate of deforestation in the Reserve, and the pressure, state, and response on natural resources, providing good baseline data on the status of biological resources.

3. MSP Preparation

The existence of these programs and emerging positive results suggested to local community groups and MDI that a successful barrier removal demonstration effort should be launced in the BOSAWAS region. To assist in these efforts, MDI requested World Bank/GEF Block A assistance, and MSP preparation was initiated in May 1999.

For coffee related activities, the targeted groups needing formal incorporation in preparation for dry processing and export have done so. Business plans for the three enterprises (dry beneficios) have been developed and refined based on workshops and follow up activities with each group. In addition, several coffee companies and representatives from the TransFair Canada traveled to Nicaragua to meet with the cooperatives that are participating in this project. The 25-member tour organized by MDI and paid for by the participating coffee companies was filmed by the Canadian Broadcasting Corporation (CBC) and Canadian Wilderness Videos & Productions, Inc. The CBC video on coffee, fair trade, and the environment aired this February.

Each of the cooperatives have also begun the process of becoming eligible to sell coffee through the Fair Trade market, as requested by participating importers. Upon completion of the process, the cooperatives will be listed on the Fair Trade Label Organization (FLO) International Coffee Producers Register. Importers and roasters who participate in the fair trade program must purchase directly from small producer organizations that are on the register. (The minimum fair trade prices are currently US$ 1.26 /lb. and US$ 1.41 /lb. for certified organic.) In addition, two members from each cooperative enterprise are enrolled in a two-month training program during the current harvest at the MDI/Montes de Oro Research and Training Center at Montes de Oro, Costa Rica. This training is providing an introduction to coffee processing using the solar dryers and related equipment at Montes de Oro. The Costa Rican Cooperative and its umbrella exporting organization, COOCAFE, serve as models for the target groups, having overcome many of the same barriers to the adoption of renewable energy technologies facing the target groups.

For allspice, the cooperative completed during preparation a business plan and feasibility study for a rural enterprise to extract and process allspice berries and leaves to produce allspice essential oil based on harvest data from the community. In addition, the baseline allspice inventory and mapping was completed by Programa Frontera Agricola (PFA) and Programa Campesino a Campesino (PCAC). Also during the PDF process, two additional organizations agreed to participate in the allspice project: PFA assisting in the biological monitoring component and the creation of nurseries to expand allspice and other forest species inventory and convert areas of pasture to agro-forestry systems; and Oxfam U.K. assisting primarily with access to markets in Great Britain and Europe and capacity building within the enterprise.

For both coffee and allspice, financial organizations have been closely following the development of the methodology, equipment, and production systems, and have been consulted throughout the project preparation. These organizations are enthused about the project's potential and are eager to work with the producer organizations to develop a suitable financing plan.

4. Baseline Activities Planned

Proposed MSP activities would complement planned projects in the BOSAWAS region aimed at introducing strategies for slowing the agricultural frontier, promoting sustainable development, and protecting the BOSAWAS Reserve. These projects would form the baseline course of environmental action in the absence of GEF support. The baseline scenario would not include barrier removal activities for introducing renewable energy technologies. The total baseline cost is estimated at US$9.5 million, broken down as follows:

1) Capacity building/Training (US$5.5 million): Within the target cooperatives of Aranjuez, Boaco, and El Cuá, and throughout the region of Jinotega, the Interamerican Development Bank (IDB) is continuing its Café Eco-Forestal program. The program to introduce sustainable coffee production will provide US$500,000 annually during 2000—2002 in training activities. The German Agency for Technical Cooperation (GTZ)

program to protect and develop the BOSAWAS Reserve is funded through 2012 (US$2 million annually) primarily for the strengthening of organizations responsible for the Reserve and regional advisory and decision making committee. One fourth of these funds will go for strengthening of the communities in the buffer zone of Bosawas, that are part of this project as well (US$500,000 annually). The ongoing training and capacity building activities in the buffer zone of Bosawas of the Campesino a Campesino Program (PCAC) to increase productivity and promote environmentally sound farming, US$600,000 annually, and the Frontera Agricola Program (PFA) to reduce the spread of the agricultural frontier, US$400,000 annually, also contribute to the baseline course of action. One ongoing World Bank project in the region with related goals of this project is the Sustainable Forestry Investment Promotion Project, that will invest in training in this area (US$500,000 annually, between 2000—2003).

2) *Marketing program (US$40,000):* Baseline expenditures for these activities are limited to the ongoing marketing program in the U.S. and Canada for solar-dried coffee with links to Nicaragua. As part of this marketing effort, several coffee companies and representatives from the TransFair Canada, the fair-trade coffee program for Canada, toured the MDI/Montes de Oro solar facility in Costa Rica in January 2000, and then traveled to Nicaragua to meet with the cooperatives that are participating in this project. The 25-member tour organized by MDI and paid for by the participating coffee companies was filmed by the Canadian Broadcasting Corporation (CBC) and Canadian Wilderness Videos & Productions, Inc. The CBC video on coffee, fair trade, and the environment aired in February.

3) *Configuration/Design and Operation Plan (US$0):* There are no ongoing programs in Nicaragua involving the design, implementation or operation of renewable energy technology for rural productive applications.

4) *Land Use and Socio-Economic Monitoring (US$3.960 million)*: The Campesino a Campesino Program and the Agriculture Frontier Program will continue to conduct ongoing evaluation of socio-economic parameters and environmental assessment related to crop and production programs, contributing to the baseline expenditures, estimated at US$40,000 and US$ 120,000 respectively during the life of the project. In addition, the GTZ program in BOSAWAS will continue monitoring the current rate of deforestation in the Reserve, and the pressure, state, and response on natural resources. The GTZ program field staff will conduct surveys on the use of natural resources throughout the region. GTZ expenditures for their BOSAWAS program over life of project is estimated at US$3.8 million.

EXPECTED PROJECT OUTCOMES: ALTERNATIVE COURSE OF ACTION

The alternative course of action will provide global benefits in terms of reduced CO2 emissions and reduced pressure on the natural habitats in the BOSAWAS Reserve by

removing barriers to the implementation of renewable energy technologies for biodiversity friendly agro-industrial processes and strengthening opportunities for sustainable land use management in the BOSAWAS buffer zone.

Over the course of three years, the project seeks to introduce renewable energy technology with the following outcomes.

1. Information and capacity barriers removed in pilot zone through completion of technical training and capacity building program.

   Solar drying/processing systems in target towns would serve as profit/demonstration centers to encourage further dissemination of solar systems in the Mesoamerican region. The expansion of solar/biomass coffee and allspice drying systems in the region, beyond the project plan, would show that barriers to adopting renewable energy technology have indeed been removed for this sector.

2. Revenues for producers increased and market for solar processed coffee and allspice essential oil on the specialty market expanded.

   By transitioning to agro-industrials, the farmers benefit from value added that processing and export allow. The increased revenues help to ensure viability and permanence of the shade coffee plantations, which increasingly play an important role in preserving biodiversity.

   The increased revenues for allspice shareholders provide incentives to sustainably produce and harvest allspice on their parcels, facilitating a break from the reliance on conventional agriculture that contributes to the shifting agricultural frontier, a threat to the BOSAWAS region, a region of fragile soils.

3. Renewable energy technology for coffee and allspice drying with sufficient technical training and support services introduced in the BOSAWAS buffer zone.

   Installation of ten solar drying systems and related processing equipment for a combined drying and processing capacity of 30,000 qq. of coffee and 2,000 lbs. of allspice essential oil, eliminating the use of firewood for drying for the target cooperatives. Over life of project, this represents an estimated reduction of CO2 emissions of 80,994 MT.

4. Less people engaged in unsustainable natural resource uses in the BOSAWAS Reserve.

   Reduction in the demand for fuel wood for processing allspice and coffee would lead to reduced pressure on the natural habitats in the BOSAWAS Reserve. A lowered rate of deforestation rate in the reserve relative to the baseline would result.

5. Greater knowledge of the benefits to the climate and biodiversity from sustainable production systems and of the relationship of allspice habitat to biodiversity through implementation of the project's monitoring and information system.

The monitoring and information system developed for the program will allow each of the coffee processing enterprises to routinely track throughput, revenues, and exports. The tracking of this information is standard for processing and exporting organizations and will be included in the capacity building and management training activities.

With regard to climate change, the monitoring and information system will track the estimated reductions in CO2 emissions through the use of solar drying systems. Key indicators will include the amount of solar-dried coffee and allspice processed and increase in area of allspice habitat compared to baseline.

Biological monitoring will build on the allspice and land use mapping and inventory that was completed as part of the project development phase. Socio-economic monitoring will determine the ability of the project to anchor families to their parcels. Recent GTZ studies conducted inside the Reserve and first-year data will be used as the baseline. Further monitoring and evaluation will attempt to document the benefits to biodiversity from the sustainable production systems that will be introduced, as well as to examine the relationship of natural allspice habitat to biodiversity. Information gathered and knowledge acquired would be of considerable value to similar situations of natural resource degradation found in many other parts of the world.

ACTIVITIES AND FINANCIAL INPUTS: INCREMENT NEEDED TO ENABLE CHANGE

To achieve project objectives and outcomes, the following activities over the baseline will be implemented:

1. Develop and implement capacity building/training program and outreach activities— (US$193,700, funded fully by GEF).

GEF funds will be used to remove technical and informational barriers to the adoption of renewable energy technology by building technical capacity and developing and disseminating working models and methodologies (lessons learned).

Training programs will build the human capital to support the installation, operation, maintenance and repair of solar and related equipment, as well as quality control, management, administration, and export issues. For the coffee component, solar/biomass dryer operators will be trained (30) and a core team from the Campesino a Campesino Program will be trained at the MDI/Montes de Oro Field Research and Training Center in processing, quality control, and export issues (10). A core technical team trained in system installation and maintenance, fundamentals of solar thermal and photovoltaic systems (6) will be assembled. In addition, members will be trained in management and administration (9), and organizational seminars for the cooperative membership at large will be conducted (at least one per cooperative per year). -Ongoing managerial and administrative support will be incorporated into the capacity building activities.

For the allspice component, solar/biomass dryer operators will be trained (10) and a core technical team will be trained in system installation and maintenance, fundamentals of solar thermal and photovoltaic systems, steam generation and distillation (15). In addition, members will be trained in management and administration (5), and organizational seminars for at large shareholders will be conducted (at least one per year).

This human capital will allow for the expansion and replication of the working methodology and renewable energy technology in other areas of the BOSAWAS Reserve buffer zone, as well as other regions in Honduras and Guatemala, effectively removing barriers to the introduction of renewable energy technology and reducing implementation costs for productive applications with well-established international markets.

Each of the processing facilities will serve as profit/demonstration centers for other cooperatives and associations of producers in throughout the region. Demonstration events will be coordinated to promote the replication of renewable technology and program methodology.

Lessons learned and progress in project activities will be presented during the community seminars. Dissemination of information, progress, and results will be publicized in UNAG's publications. In addition, project information will be shared with regional projects, such as the Biomass User's Network and project progress will be shared with the National Corridor Coordinator and Regional Coordinator.

2. Implement marketing program to increase demand for coffee dried using renewable energy technology & connect with growing market for essential oils— (US$775,700, of which participating importers/distributors would provide US$564,000 and the GEF would contribute US$211,700).

Marketing activities for coffee will link the small producer with an alliance of coffee importers/roasters that are seeking to market coffee dried using renewable energy technology. For the allspice component, the marketing program will build demand for allspice and allspice essential oil processed by rural communities using renewable energy technology following the same approach as used to build demand for coffee. Several distributors of allspice essential oil will participate by purchasing essential oil produced by the project.

Marketing materials, including pamphlets, ad copy, promotional video, and content for web sites will be jointly developed by MDI and participating importers and distributors. The Canadian International Development Agency (CIDA) will provide a short documentary-style video that will be used to promote coffee sales from the project. The marketing program will also bring importers/distributors to the cooperatives to establish customer relationships.

GEF funds would help finance the market program to promote Café Solar® and Rainforest Essential Oils™. This funding assists in removing an informational barrier to

the adoption of renewable energy technology for productive applications, lack of access to international markets for "value-added" products.

3. Final configuration, installation and operation of allspice processing plant and dry beneficios using solar/biomass—(US$955,700, of which financial institutions would contribute $700,000 and GEF would contribute US$255,700).

The basic configuration of these plants is complete, but it needs to be refined on the site, to make the plant configured to adjust to local conditions such as the type of local equipment and the micro climate. GEF funds would finance the configuration and installation of the equipment, thereby removing a technical barrier to the adoption of renewable energy technology, the lack of equipment designed and configured to provide a turnkey operation for this application.

Specifically for the coffee component, a configuration, implementation and operational plan adapted to local conditions will be developed to provide a turnkey operation for the coffee beneficios. The plan will incorporate the possibility for expansion based on market development. The solar/biomass coffee drying systems and related processing equipment and storage systems is estimated at $600,000. This allows for the installation of six solar drying systems at three off-grid sites, along with equipment for milling, sorting, and storage. Each site will have a capacity to process 10,000 quintales (qq) (1 qq =100 lb. sack).

For the allspice component, a configuration, implementation and operational plan for the allspice processing plant based on local conditions will be developed. The solar/biomass drying systems and biofuel/solar processing equipment, including trimming and pruning equipment, is estimated at US$100,000. The estimated initial minimum required capacity of the processing plant is 1,000 lb. of essential oil from allspice berries and leaves.

4. Land use and socio-economic monitoring—(US$ 243,900, of which MDI would contribute $180,000 and the GEF would contribute US$63,900).

This component will address OP#6 and OP# 3. The monitoring program will track key indicators including the number of systems installed, amount of coffee and allspice processed and exported, and the corresponding estimated reductions in CO2 emissions through the use of solar drying systems, revenues and profits for the target cooperatives, as well as employment opportunities provided by the program and those afforded to women.

The monitoring program will include ongoing mapping, building on PDF baseline mapping activities, of area of reforestation with allspice trees and corresponding reduction of pasture within target zone. The monitoring program will track the area and quality of allspice resource, change in habitat as compared to baseline, and variation in yields.

In addition, the biological evaluation and monitoring will examine the biodiversity characteristics of allspice productive systems, including: change in allspice habitat as compared to baseline; and assessment of biodiversity benefits over baseline. An assessment of natural allspice habitat in terms of contribution to biodiversity and understanding of the ecology of the allspice habitat will be conducted over the course of the project.

SUSTAINABILITY ANALYSIS AND RISK ASSESSMENT

Factors for Success:

Several factors bode well for the long-term success of the project beyond the medium size project funds:

- The three-year capacity building and training component and the long-term presence and strength of the Campesino a Campesino Program should be sufficient to keep the enterprises robust.
- The high entrepreneurial drive of the shareholders, who have organized and incorporated, and have contributed their own funds to the enterprise.
- The Ministry of Natural Resources and the Environment (MARENA) has keen interest in the successful outcome of the project, and the project has the support of the Central American Commission on the Environment and Development (CCAD) Mesoamerican Biological Corridor project team, as well as the Specialty Coffee Association of America (SCAA).
- The principal factors that will ensure success for this project are market forces that are seeking the "value-added" products and marketing advantages they offer. For both sustainably produced coffee and allspice essential oil, there is a growing and stable market (See Annex V). The significant gains in revenues that processing and export allow are substantial enough to promote capital investment and support ease of payback for these rural enterprises.

Risk Factors:

Projections for global benefits to biodiversity assume that by virtue of not cutting forests for fuel wood, there will be habitat preservation in the region. However, there is a risk that although land conversion to fuel agro-industrial drying processes is halted, conversion would take place from other activities. Project activities related to outreach and education, as well as support from GTZ program will help reduce this risk.

A second risk is that barriers to the adoption of renewable energy technologies may not be fully removed. In this case, dissemination of these technologies to surrounding communities will not take place as quickly or completely as projected. However, the project is designed precisely to mitigate this risk by focusing on the specific barriers that prohibit the use of renewable technologies in the region.

In addition, there are two other risks which relate to market conditions. Of these, the principle risk is the market acceptance by importers and distributors for sustainably processed value-added products, coffee and allspice essential oil. To mitigate this risk, importers/distributors have been involved early on in the project. A pilot marketing program involving the sale of solar-dried coffee in the US and Canada through an alliance of importers was conducted. The program resulted in several companies committing to market the coffee and a branding program in which the trademark Café Solar® was introduced to distinguish coffee processed using renewable energy technology. In addition, representatives from the TransFair Canada and TransFair USA programs toured the solar facility at Montes de Oro to become familiar with the program. Six coffee companies have toured the cooperatives involved in the project in order to promote future sales.

To prepare the market for allspice essential oil, MDI has consulted closely with essential oil distributors who desire to market the essential oil. The story behind the allspice production resonates with the target market, and distributors are eager to use it in marketing activities.

A second risk related to the coffee market is the cyclical nature of coffee prices. From year to year coffee prices may vary significantly and a drop in prices can have significant adverse impact on producers. To mitigate this risk, as much coffee as possible will be channeled through the specialty market and fair trade programs where prices are less volatile. During the pilot program, coffee moving through these channels maintained much more stable prices than coffee sold through the New York commodities market. Also, the processing facilities include hermetic storage systems that allow the producers to hold dry coffee on site without risk of quality degradation until the market condition improve.

STAKEHOLDER INVOLVEMENT AND SOCIAL ASSESSMENT

Stakeholder Identification:

The key stakeholders are the campesino families that make up the four cooperatives involved in the project. These families are nearly entirely mestizos and are well established in farming and subsistence farming activities. Their incomes are supplemented by other farming activities including vegetables, goats, and some cattle. Most of the coffee producers have been working their plantations for many years. The coffee producers are centered near the following towns and harvest from 0.5 to 5 hectares of coffee:

- Boaco: Approximately 200 families from four small communities centered in Boaco, belonging to the Cooperativa Agropecuaria de Servicios de Pequeños Productores de Café R.L., Boaco
- El Cuá: Approximately 600 families from six small communities centered in El Cuá, belonging to the

Cooperativa Agropecuaria de Servicios de Pequeños Productores de Café Peñas Blancas R.L., El Cuá Jinotega

- Aranjuez: Approximately 600 families from Aranjuez, belonging to the Cooperativa Agropecuaria de Crédito y Servicios Solidaridad R.L., Aranjuez, Matagalpa

For allspice, the 54 targeted families are from four small communities centered in Siuna and belong to the Cooperativa Agropecuaria de Servicios de Extracción de Aceites Esenciales R.L., El Bálsamo. These families derive their livelihood largely from subsistence farming in the agricultural frontier surrounding the BOSAWAS Reserve. The average family size in the cooperative is six. The average plot of land for these families is 31 hectares with 2.3 hectares reserved for allspice expansion.

Other stakeholders involved in the project include:

- The body of members of the cooperatives that will be trained in the various methods and technologies for the project;
- The technical assistance Campesino a Campesino Program of UNAG;
- The Frontera Agricola Program, for technical assistance for biological monitoring;
- Oxfam U.K., for technical assistance and marketing;
- The Ministry of Natural Resources and the Environment; and
- The alliance of importers/roasters/distributors that will purchase the coffee and allspice products.

Social Assessment:

The nearly 1,500 families in the project are involved in coffee production, and in Siuna, subsistence farming in the agricultural frontier. While the coffee producers hold title to their farms, roughly half of the farmers in Siuna are in the process of obtaining titles for the land. There is no clearly defined ethnic group with nearly all of the families of Mestizos origin. The area of El Cuá is experiencing a large influx of settlers since the end of armed conflict. The BOSAWAS region surrounding Siuna is also experiencing a large influx of settlers drawn by the availability of land and resources. This pattern of migration and its accompanying advance of the agricultural frontier threaten the forests of the BOSAWAS region.

The project includes former armed combatants from both sides of the conflict now working together to build productive enterprises. While the typical level of formal education is limited to elementary school, the members exhibit strong organizational skills and through the PCAC program have developed three-year strategies for the growth of the cooperative and have contributed to the development of the business plans. These farmers have excelled in organic and shade production methods and have become engaged in a technical exchange program with Cooperative Montes de Oro in Costa Rica. Delegations from Cooperative Montes de Oro have traveled to Nicaragua to learn organic farming techniques, and cooperative delegations have traveled to Montes de Oro to study processing methods.

Women are typically excluded from coffee processing and management activities in this sector. The technical training and community building aspects of the project will be particularly directed to women to improve their technical knowledge and employment opportunities. Activities to enhance the participation of women will include childcare support at the beneficio and distillation plant.

Harvesting of allspice is essentially a smallholder business in rural areas, where women play a major role in all stages, from growing and harvesting to grading and packaging. Of the 300 harvesters of allspice in the area of Siuna, 100 are women. Spices are an important source of cash income and the development of the allspice extraction and processing center will offer economic and training opportunities for women.

In general, the communities face challenges typical of rural Nicaragua, including that of infectious diseases, for which children are especially vulnerable, due to lack of safe drinking water and medical services.

FINANCING PLAN AND INCREMENTAL COST ASSESSMENT

This proposed MSP supports the introduction of renewable energy technology, and increased production and export capacity in the Mesoamerican Biological Corridor. The GEF-financed activities support the removing of barriers to the adoption of renewable tehcnologies and will provide for technical assistance, training and capacity building, as well as land use and socio-economic monitoring.

Baseline Scenario

Activities and results: In the absence of GEF support, baseline investment in the climate change activities and biodiversity evaluation and monitoring in the target areas over the length of the project would be US$ 9,500,000. This funding represents investment in natural resource management, aimed at slowing the agricultural frontier, promoting sustainable development, protecting the BOSAWAS Reserve, and building institutional capacity. There are no activities in the baseline aimed at climate protection.

1) Capacity building/Training/Outreach and Dissemination (US$ 5.500 million): Activities include: expansion of sustainable coffee production systems within the target cooperatives and buffer zone region; ongoing programs for the protection of watersheds and institution strengthening for organizations responsible for the BOSAWAS Reserve and surrounding region; and ongoing training and capacity building activities to increase productivity and promote environmentally sound farming and reduce the spread of the agricultural frontier. The baseline costs for these activities are funds spent by international donors (US$2.5 million), as well as the project partners, PCAC (US$1.8 million) and PFA (US$1.2 million).

2) *Marketing program* (US$40,000): Marketing activities are limited to the ongoing marketing program in the U.S. and Canada for solar-dried coffee with links to Nicaragua. The baseline costs for these activities are funds spent by U.S. and Canadian coffee companies.

3) *Configuration/Design and Operation Plan* (US$0)

4) *Land Use and Socio-Economic Monitoring* (US$3.960 million): Activities include baseline evaluation of socio-economic parameters and environmental assessment related to crop and production programs, and allspice baseline resource assessment, which provide the point of reference on which to build the proposed alternative monitoring and evaluation programs. Also included are regional field surveys on pressure-state-response of natural resources throughout the BOSAWAS region.

The baseline costs for these activities are funds that will be spent by the Campesino a Campesino Program (US$40,000) and the Frontera Agricola Program (US$120,000) to create the allspice baseline assessment, socio-economic and crop and production assessment in the target region. In addition the German Agency for Technical Cooperation will spend US$3.8 million in field surveys of natural resources pressure–state–response in the BOSAWAS region. The monitoring of the biodiversity impact will be done in the project area and inside the reserve by MDI, PCaC, and GTZ.

Benefits of baseline: Local and global benefits generated by improved management of the BOSAWAS Reserve will achieved by the baseline through training and strengthening of local organizations, improved natural resources management, and information and assessments of local environment conditions. The baseline scenario does not include technical support or capacity building needed to introduce renewable energy technology for coffee and allspice drying systems. In the absence of such support, lending organizations will be unwilling to finance the technology, and marketing partners will not participate. Moreover, biodiversity and carbon sequestration consideration will not be incorporated into management decisions about the use of coffee and allspice. As a result, processing allspice and coffee will continue to result in forest conversion and CO2 emissions will continue under the baseline scenario without the proposed MSP.

GEF Alternative

The proposed MSP activities are complementary to baseline activities and would address the removal of barriers to the introduction of renewable energy technology and allow for the introduction of biodiversity friendly extraction methods in the BOSAWAS buffer zone. The estimated cost of the GEF Alternative is US$ 11.669 million (baseline +MSP). The alternative would support the following activities needed to achieve the global environmental objectives:

1) Capacity building/Training/Outreach and Dissemination (US$ 5,693,700): This component will include activities in the baseline scenario related to natural resource management capacity building, training and outreach plus the removal of information and capacity barriers to the adoption of renewable energy technologies in the pilot zone through training programs to build the human capital to support the installation, operation, maintenance and repair of equipment, as well as to address quality control, management, administration, and export issues facing the target cooperatives (OP#6).

2) *Marketing program* (US$815,700): This component will include marketing activities in the baseline scenario plus the removal of institutional barriers to the introduction of

renewable energy technologies through implementation of marketing programs that build demand for allspice essential oil processed by rural communities using renewable energy technology and link the small producer with an alliance of coffee importers/roasters that are seeking to market coffee dried using renewable energy technology (OP#6).

3) *Configuration/Design and Operation Plan* (US$955,700): This component will include the removal of technical barriers to the introduction of renewable energy technologies through the provision of a configuration, implementation and operational plan, thereby providing turnkey operations for the coffee beneficios and the allspice processing center that use renewable energy technology (OP#6).

4) *Land Use and Socio-Economic Monitoring* (US$4,203,900): This component will include monitoring activities in the baseline scenario plus greater knowledge of the benefits to the climate and biodiversity from sustainable production systems through monitoring and evaluation programs that measure and track key indicators such as the amount of coffee and allspice processed and corresponding estimated reductions in CO2 emissions. The alternative will also lead to a greater understanding of the relationship of allspice habitat to biodiversity through land use monitoring activities (OP#6, OP#3).

Global Benefits of the Alternative: These activities will result in the generation of global benefits through the removal of barriers to successful implementation of renewable energy technology for agro-industrial applications, thereby reducing CO2 emissions and eliminating a significant contributor to deforestation: the use of fuel wood to dry the harvests. These activities will also reduce pressure on the natural habitats in the BOSAWAS Reserve through strengthening opportunities for sustainable land use management in its buffer zone. The Alternative will also result in improved knowledge of biodiversity benefits of allspice productive systems and the contribution of natural allspice habitat to biodiversity.

Costs

The total cost of baseline is US$9.5 million. The cost of the GEF Alternative is US$11,669,000, and this results in an increment of US$2.169 million. Co-financing of US$1.444 million of this increment has been mobilized as follows: US$700,000 through lending organizations to finance the equipment purchases; US$564,000 through marketing programs and the purchase of coffee, and US$180,000 from MDI for monitoring. (For more information on co-financiers, wee Annex VI). This co-financing was in part mobilized by the potential availability of GEF funding, but is also attributable to significant domestic benefits from the proposed MSP activities. The requested GEF contribution is US$725,000, to help cover the incremental costs to reduce CO2 emissions and pressure on the natural habitats in the BOSAWAS Reserve through remove barriers to the adoption of renewable energy technologies and land use and socio-economic monitoring.

The incremental costs assessment is summarized in the following table:

	BASELINE US$	GEF ALTERNATIVE US$	INCREMENT US$

	Total	Total	Total	Other Donors	GEF
I. Capacity Building/Training/Outreach and Dissemination	5,500,000	5,693,700			193,700
Regional capacity building	5,500,000	5,550,000			50,000
Installation and repair training		50,000			50,000
Operation and maintenance training		20,000			20,000
Quality control and export training		23,700			23,700
Processing training		50,000			50,000
II. Marketing Program	40,000	815,700	775,700	564,000	211,700
III. Configuration/ and Operation Plans		955,700	955,700	700,000	255,700
Dry beneficio equipment and operation		655,700	600,00	600,000	
Allspice plant equipment and operation		200,000	100,000	100,000	
Removal of technical barriers		255,700	255,700		255,700
IV. Land Use and Socio-Economic Monitoring	3,960,000	4,203,900	243,900	180,000	63,900
Regional natural resource use surveys	3,920,000	3,920,000			
CO2 emissions reduction		80,000	80,000	50,000	30,000
Allspice habitat and biodiversity analysis	30,000	149,900	119,900	100,000	19,900
Socio-economic analysis	10,000	54,000	413,000	399,000	14,000
TOTAL Implementation	9,500,000	11,669,000	2,169,000	1,444,000	725,000

IMPLEMENTATION BUDGET

A summary of MSP costs by expenditure category and financier is presented below. The GEF contribution for MSP development was $25,000 (PDF A), for a total GEF contribution (PDF A + MSP) of $750,000.

Estimated Breakdown of Costs by Budgetary Component (US$)

COMPONENT	GEF	OTHER DONORS	PROJECT TOTAL
New NGO personnel	191,925	140,000	331,925
Technical Assistance	191,925	140,000	331,925
Services	171,150	100,000	271,150
Goods	50,000	800,000	850,000
Workshops and Training	25,000	100,000	125,000
Operational Costs	75,000	164,000	239,000
Unallocated	20,000	0	20,000
TOTAL MSP	**725,000**	**1,144,000**	**2,169,000**
PDF A	25,000		
TOTAL GEF (MSP + PDF A)	**750,000**		

PROJECT IMPLEMENTATION PLAN

MDI will execute the project in collaboration and partnership Programa Campesino a Campesino. MDI will also be responsible for providing the configuration and design of processing plants, and technical assistance for the installation, operation, and maintenance of equipment. Campesino a Campesino will provide local administration, technical and organizational and managerial assistance, and will aid in monitoring socio-economic indicators. The Campesino a Campesino Program works in close consultation with the members it serves and has opened an additional Matagalpa office, specifically for the GEF project. Existing offices are also located in Managua, Siuna, Boaco, and Matagalpa. The planned long-term collaboration of MDI and PCAC will permit PCAC to adopt these barrier removal and technical training programs and methodologies to its repertoire of services for campesino organizations.

In addition, Frontera Agricola will provide technical assistance and the mapping and monitoring program for Siuna. An alliance of coffee importers/roasters will purchase coffee and collaborate on the development and implementation of marketing initiatives. Likewise, allspice importers and distributors will provide market development support. The National Renewable Energy Laboratory will assist MDI with design and technical issues relating to the renewable energy components of the project. In addition, consultants and specialists will be contracted to assist with the training for processing, quality control, as well as export issues.

The schedule for project activities is presented in the table below:

DURATION OF PROJECT (IN MONTHS): 36							
ACTIVITIES	PROJECT-MONTHS						
	0	6	12	18	24	30	36
1. Development of configuration/design plans for drying and processing sites (12 months); Installation and operation of equipment (30 months)	----------]		----------]				
2. Capacity building/training/Oureach (24 months)			----------]				
3. Marketing program to build market and ensure growing number of buyers for product (30 months)			----------]				
4. Land use and socio-economic monitoring (36 months)	----------]						

PUBLIC PARTICIPATION PLAN

Key stakeholders have been involved in the project preparation stage. MDI and Campesino a Campesino visited each stakeholder community and consulted with members of the participating groups. In addition, formal workshops with each group were conducted to discuss the proposed project in detail and assist the cooperatives with development of business plans and provide legal counsel regarding organization and incorporation for the new enterprises. The importance of participation of women was a topic at each of the project preparation workshops, each of which included women. A woman was elected to the office of treasurer during the workshop to organize the allspice extraction and essential oil enterprise.

In Siuna, two workshops were conducted over four days to elect the officers and adopt bylaws for the new enterprise. The workshops also provided the results of member surveys regarding the number of trees on each shareholder's parcel, as well as recent harvest data. Meetings were also held at MARENA, where the Programa Frontera Agricola presented the progress of their allspice mapping and mapping training programs, and MDI and PCAC, in consultation with PFA, developed a criteria for monitoring biodiversity for the allspice project based on the results of the initial assessment and mapping.

With respect to coffee, several delegations from the participating cooperatives participated in workshops to discuss all aspects of the proposed project at the MDI/Montes de Oro Field Research and Training Center in Miramar, Costa Rica. The importance of developing and instilling an entrepreneurial spirit or understanding, while not diminishing the image or role of campesino as farmer/steward working in close relationship with the environment and community, was discussed at these workshops. The model of campesinos organized in enterprises to capture "value-added" through processing and direct export activities has come to be referred to as "la cultura productiva campesina" by the participants. In addition, a delegation from Montes de Oro traveled to Nicaragua to exchange experiences and practices with their Nicaraguan counterparts. Currently, two representatives from each of the three coffee enterprises have been selected to participate in a two-month training program at the Center during the current harvest to gain experience in solar coffee drying, processing, and quality control.

Participation during implementation by the local producers of coffee and allspice will also be critical to the success of the project. The project is designed to involve active participation of these producers at every stage of the project, as the principal activities of the project are to build community capital. Cooperative-wide workshops will be conducted each year to promote shareholder participation in project evolution, evaluation, and decision making.

Information will be disseminated through a series of meetings each project year with primary stakeholders groups and the general public that will be reached by media programs on local radio, distribution of written material, and public meetings. Content for web sites will be generated for several existing and planned sites in order to promote allspice and coffee sales, as well as to encourage project expansion.

Dissemination of information, progress, and results will also be publicized in UNAG's publications. In addition, project information will be shared with regional projects, such as the Biomass User's Network and project progress will be shared with the National Corridor Coordinator and Regional Coordinator

MONITORING AND EVALUATION PLAN

The internal evaluation activities will be performed annually and in accordance with the institutional planning and evaluation activities carried out by MDI each year. The external monitoring and evaluation activities will be monitored by supervision missions from the World Bank and in accordance with the terms of reference that will be jointly defined with MDI. Furthermore, technical as well as financial reports about the development of the implementation of the project will be distributed to donors. Record-keeping procedures will also be evaluated as part of the general financial audit of MDI and endorsed by a certified financial auditor. Finally, the set of indicators will permit the monitoring and evaluation of the status of the biodiversity and climate change attributes of the project outlined below:

Climate change indicators:

Key indicators to be monitored include amount of solar-dried coffee and allspice processed, corresponding reductions in CO2 emissions; amounts of exported; changes in revenues and profits; number and quality of employment opportunities.

The reductions in CO2 emissions from solar drying systems over conventional wood-fired drying systems come from the avoidance of combustion, as well as avoiding the loss of carbon sink that cutting forest for firewood entails. For life of project, the combined drying capacity represents a reduction of 80,994 MT reduction of CO2 and a saving of 222 hectares of clear cut forest over conventional dryers. Assuming the equipment lasts 20 years, reductions in CO2 from project over the long-term are estimated at 539,960 MT.

The expansion of forest cover through the introduction of a sustainable allspice production system in the fourteen communities near the allspice target site will provide an additional fixed carbon sink of approximately 84,287 MT over the next three to six years. The expansion to the nearly 100 coffee producing cooperatives in the areas surrounding the target sites would provide a reduction of CO2 of nearly 270,000 MT per year.

Calculations	Reference
Fuel consumption for drying coffee, Central American average: 0.26 cubic meters of firewood per qq.	MDI field research; Costa Rican Coffee Institute
Yield of biomass extraction from tropical forest: 55 metric tons per hectare	Etimaciones de los Beneficios Ambientales, Lenin Corrales, September 1998, p.11.
Fixed carbon in a secondary broad leaf forest: 120.53 tons per hectare	IICA, Boletin 81 Enero-Abril, 1999, p. 13.
Fixed carbon in a broad leaf forest: 266.41 metric tons per hectare	IICA, Boletin 81 Enero-Abril, 1999, p. 13.
Fixed carbon in a coffee plantation: 91.64 metric tons per hectare	IICA, Boletin 81 Enero-Abril, 1999, p. 12.
CO2 emissions by wood combustion in pounds of CO2 per pound of wood: 1.797	Tyler G. Hicks, Standard Handbook of Engineering Calculations, third edition, p3.200.

Biodiversity Indicators:

Key indicators to be monitored include extent of allspice habitat maintained and restored over the baseline within the target zone and corresponding increase in biodiversity as measured by the reduction in the extent of pasture over baseline.

The monitoring program will include ongoing mapping, building on PDF baseline mapping activities, of area of reforestation with allspice trees and corresponding reduction of

pasture within target zone. The ongoing monitoring program will track the area and quality of allspice resource, change in habitat as compared to baseline, and variation in yields. In addition, biological evaluation and monitoring will examine the biodiversity characteristics of allspice productive systems, including an assessment of biodiversity benefits over baseline. An assessment of natural allspice habitat in terms of contribution to biodiversity and toward understanding of the ecology of the allspice habitat will be conducted over the course of the project. The biodiversity monitoring will be done inside and outside the reserve with the contribution of MDI, CaC and GTZ.

Baseline data on the number and location of allspice trees for the target area have been recorded and mapped, along with areas of pasture and forest cover. Since the target zone is largely deforested, the most straightforward indicator of increasing biodiversity will be the amount of pasture converted to allspice and other appropriate forest species, such as, cocoa, banana, musaceas, tempate, citrus fruits, and cinnamon, in support of the program. The Frontera Agricola Program (PFA) is providing ongoing technical assistance in training for mapping using GPS systems and MapMaker Pro software. In addition, PFA is providing technical assistance and materials for the establishment of nurseries in support of the program.

A longer-term parameter to measure is the anchoring of shareholders to their respective parcels. This would be a significant achievement in stopping the infiltration of the agricultural frontier that threatens the Biosphere Reserve.

PROJECT CHECKLIST

PROJECT ACTIVITY CATEGORIES			
Biodiversity	Climate Change	International Waters	Ozone Depletion
Prot. area zoning.mgmt: X	Efficient prod & dist.: X	Water body:	Monitoring:
Buffer zone development: X	Efficient consumption:	Integrated land and water:	Country program:
Inventory/monitoring: X	Solar: X	Contaminant:	ODS phaseout: X
Ecotourism:	Biomass: X	Other:	Production:
Agro-biodiversity: X	Wind:		Other:
Trust fund(s):	Hydro:		
Benefit-sharing: X	Geothermal:		
Other:	Fuel cells:		
	Other:		
TECHNICAL CATEGORIES			
Institution building: X			
Investments: X			
Policy advice: X			
Targeted research: X			
Technical/management advice: X			
Technology transfer: X			
Awareness/information/training: X			
Other:			

ANNEX I: Project Map

ANNEX II: Detailed Information on the Cooperative's Members
Agriculture Cooperative for the Extraction of Essentila Oil, R.L., Siuna

N°	First Name and Last Name	Community	N° of people in the family	Total Area in Mz	Legal Status of Land Tenure	Area con Frijol Abono	Harvestable Allspice Trees	Growing Allspice Trees	Nurseries	Water Sources
1.	Genaro Centeno Rivera	La Bobina	10	50	Title	8	0	300	300	2
2.	Tomás Flores González	Rosa grande	7	80	In process	20	0	50	800	1
3.	Porfirio Torres Ochoa	Rosa Grande	8	100	Title	4	0	0	300	1
4.	Arandu Rayo Gadea	Rosa Grande	5	12	In process	1	0	0	600	1
5.	Arcenio Hernández	R. Alegre	5	20	In process	1	0	0	300	0
6.	Juan González Aguilar	Las Quebradas	6	8	Title	1	0	0	300	1
7.	Alfredo López Herrera	R. Alegre	8	66	In process	5	0	10	400	1
8.	Efraín Centeno Centeno	Rosa Grande	8	100	In process	10	40	20	300	1
9.	Lino Jarquín Aguinaga	Bálsamo	3	30	In process	2	8	0	300	1
10.	Amelio Obando Muñoz	La Bobina	7	110	Title	5	0	0	300	1
11.	Heliodoro Martínez Ramos	El Bálsamo	6	10	In process	3	0	40	300	0
12.	Eymis Aráuz Ríos	Rosa Grande	3	50	Title	3	5	0	300	1
13.	Ignacio Cruz Barreras	R. Alegre	10	27	In process	6	0	120	400	2
14.	Atanasio Baldonado C.	R. Alegre	6	70	In process	1	0	0	300	1
15.	Reyna López Herrera	R. Alegre	5	80	In process	0	0	0	300	1
16.	Francisco Ríos Jerez	Ocote Ctral.	6	30	In process	2	0	0	300	1
17.	Antonio Abendaño Peralta	Ocote Ctral.	4	12	Title	1	0	0	400	1
18.	Marlene Blandón Laguna	Ocote Ctral.	4	6	Title	1	0	0	300	1
19.	José Antonio Reyes López	R. Alegre	3	70	In process	1	0	0	300	1
20.	Humberto Sáenz Leiva	Aló Central	4	35	Title	5	0	5	100	2
21.	Pedro Martínez Centeno	El Bálsamo	8	45	Title	8	0	250	400	2
22.	Celina Morán Medina	El Bálsamo	8	4	In process	1	0	0	300	1
23.	Pedro C. Mairena Centeno	Ocote 2	9	50	In process	4	0	0	300	1
24.	Anastasia Ordóñez García	Rosa Grande	5	5	In process	1	0	100	300	1
25.	Roldán Rayo Soza	Rosa Grande	6	5	In process	2	0	100	300	1
26.	Eufrasio Calderón Fajardo	Danlí Central	6	200	Title	10	0	0	300	1
27.	Gabino Lizano Cantillano	Tadazna	6	90	Title	8	0	0	300	1
28.	Francisco López Aráuz	Tadazna	5	80	Title	8	0	0	300	1
29.	Martín Luques Rivera	El Bálsamo	8	40	Title	3	6	80	600	1
30.	Filemón González	Rosa Grande	4	80	Title	3	8	10	500	1
31.	Pedro Pérez González	El Bálsamo	7	10	In process	1	4	20	300	1
32.	Agustín Borges Cruz	Danlí Arriba	8	100	In process	2	0	0	300	1
33.	Policarpo Muñoz M.	Hormiguero	10	40	In process	2	0	0	300	1
34.	Eloy Salgado Soza	Hormiguero	8	60	In process	4	0	0	300	1
35.	Fermín Estrada Díaz	Hormiguero	6	10	In process	0	0	0	300	1
36.	Marcial Herrera López	R. Alegre	11	67	Title	8	40	300	300	1
37.	Marcelo Centeno Centeno	La Bobina	7	6	Title	4	0	0	300	0
38.	Rosalío Tinoco Pravia	Aló Central	8	60	In process	5	0	0	300	1
39.	Doroteo Gómez Aguilar	Oro Fino	7	23	Title	1	0	0	200	1
40.	Zenen Centeno Ordóñez	Danlí Arriba	5	50	In process	2	0	0	100	1
41.	Cosme Palma Vílchez	Danlí Arriba	6	60	In process	2	0	0	300	1
42.	Modesto Pérez Gómez	El Bálsamo	8	60	In process	0	10	0	100	1
43.	Roger López Martínez	Danlí Central	5	20	In process	7	0	0	300	1
44.	Fabián Saavedra Castillo	El Dorado	4	6	In process	1	0	0	200	1

45.	Cesar A. Ordóñez Ramos	Rosa Grande	6	45	Title	5	0	0	300	1
46.	Juan Centeno González	El Guayabo	4	20	In process	0	0	0	200	1
47.	Juan Méndez Martínez	Rosa Grande	4	10	In process	0	0	0	200	1
48.	Armando Jarquín Zamora	El Bálsamo	10	42	Title	2	3	200	300	1
49.	Orlando Martínez Centeno	R. Alegre	7	7	In process	0	0	0	200	1
50.	Angel Sequeira Luques	El Bálsamo	4	37	In process	1	6	14	300	1
51.	José Angel Mercado López	R. Alegre	4	10	In process	0	0	0	300	1
52.	Miguel Gómez Aguilar	Aló Central	8	50	In process	4	0	0	100	1
53.	Domingo Hernández S.	Las Quebradas	6	13	In process	0	0	0	200	1
54.	Silverio Baldonado Calderón	R. Alegre	3	20	In process	1	0	0	300	1
			339	2391.0		180.00	130.00	1619.00	16500.00	55

Avarage: 6 people per family
Average land: 44.2 mz per family
Average Land with frijol abono: 3.33 mz per family

GENERAL INFORMATION FOR ALLSPICE PROJECT

No.	**Comunidades**	**# of farmers**	**# of Mz. with Allspice**	**# of Mz. with Cacao**	**# of Mz. with Coffee**	**# of Mz. with Jenjibre**	**# of Mz with Sacate Limón**
1	Bálsamo	30	9,000	30 Mz.	30 Mz.	15 Mz.	15 Mz.
2	Oro fino	20	2,550	20 Mz.	15 Mz.	10 Mz.	10 Mz.
3	La Bobina	10	2,000	10 Mz.	5 Mz	5 Mz.	5 Mz.
4	Aló Central	6	1,200	6 Mz.	3 Mz.	3 Mz.	3 mz.
5	Danlí Arriba	20	4,000	20 Mz.	10 Mz.	10 mz.	10 mz.
6	Danlí Central	17	3,400	17 Mz.	8 Mz.	8 Mz.	8 Mz.
7	Carao Hormiguero	18	3,600	18 Mz.	12 Mz.	9 Mz.	9 Mz.
8	El Hormiguero	11	2,200	11 Mz.	5 Mz	6 Mz.	6 Mz.
9	Rosa Grande	36	10,800	36 Mz.	20 Mz.	18 Mz.	18 Mz.
10	Rancho Alegre	28	8,400	28 Mz.	28 Mz.	14 Mz.	14 Mz.
11	Las Quebradas 1 y 2	30	9,000	30 Mz.	15 Mz.	15 Mz.	15 Mz.
12	Ocote 1 y 2	40	12,000	40 Mz.	30 Mz.	20 Mz.	20 Mz.
13	El Porvenir 1 y 2	25	7,500	25 Mz.	25 Mz.	12 Mz.	12 Mz.
14	Guaspado	9	2,700	9 Mz.	4 Mz.	5 Mz.	5 Mz.
	Totales	**300**	**66,350**	**300**	**210**	**150**	**150**

ANNEX III: Potential Market for Solar/Biomass Drying Systems Used in the Production of Allspice and Coffee

Allspice

In this initial project, 54 campesinos were selected to create the working demonstration company. This company will prove the concept and methodology and can easily be replicated throughout the buffer zone of the BOSAWAS Reserve, and other sensitive areas with indigenous allspice species throughout the Mesoamerican Biological Corridor.

Within the fourteen communities surrounding Siuna, 66,350 allspice trees are now in nursery, and there are 150 Mz of Ginger Root and 150 Mz of Lemon Grass, both of which are highly sought after for their essential oil. Combined, there are 699 ha for potential future expansion of the project. Outside Nicaragua, indigenous allspice trees are found in Honduras in the Departments of Santa Barbara, Ocotepeque, Copán, Lempira, and Cortes, and in Guatemala's northern Petén region.

Coffee

Small producers (farm units of less than 5 ha) account for more than half the world's production,"[3] and in the region of Mesoamerica, there are nearly 500,000 small producers who together account for better than 70% of that region's production[4].

Targeting these small producers, there is conservatively a potential market for 14,513 Solar/Biomass Drying Systems in Mexico and Central America alone. In Nicaragua, there are nearly 43,000 small producers working under the same circumstances as the target cooperatives for this project. Once working demonstration centers are in place, as this project will provide, there will be great demand and opportunity for rapid expansion of the tools and methodology.

The global benefits from a broader outreach effort could be significant. For example, in all of Nicaragua, an estimated 2,700 hectares[5] are cut to dry each harvest. Coffee processing accounts for 16% of the industrial consumption of wood in Nicaragua and Honduras. Throughout Latin America, the drying of coffee beans contributes significantly to the destruction of the remaining rain forests. Conventional coffee dryers consume large amounts of wood and electricity. In Central America, an estimated 36,400 hectares of forest are destroyed to supply the firewood used to dry the coffee production each harvest.

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[3] The Economist Intelligence Unit, *Coffee to 1995, Recovery Without Crutches,* Special Report No. 2116, London, Chapter 5, page 41, 1992.

[4] Food and Agriculture Organization of the United Nations (FAO) Production Year Book, various years; various coffee surveys from Central America.

[5] MDI field research. Data supported by Honduras: Issues and Options in the Energy Sector, Report of the Joint UNDP/World Bank Energy Sector Assessment Program, Report No. 6476-HO, August 1987. El Consumo De Leña En Los Beneficios de Café De Costa Rica, Problemas y Alternativas Forestales, Carlos Reicne C., José J. Campos Arce, study sponsored by Proyecto Leña Fuentes Alternas de Energia, CATIE-ROCAP (596-0089), Turrialba, Costa Rica, 1986.

Number of Coffee Producers in Central America, Mexico, and Colombia

Country	Number of farms	Number of small farms	Percentage of small farms
Guatemala	60,000*	**35,000***	58%
El Salvador	15,300*	**11,000***	72%
Honduras	63,700*	**54,100***	85%
Nicaragua	48,000*	**43,000***	90%
Costa Rica	40,000*	**30,000***	75%
Panama	30,742	**29,000**	94%
Colombia	302,945	**223,574**	73%
Mexico	280,333	**274,835**	98%
Total	841,020	**700,509**	

Source: USAID/ROCAP United States Agency for International Development/Regional Office of the Central America Program; Colombian Coffee Federation document; INMECAFE Coffee Census

* Updated figures from Interamerican Institute for Agricultural Cooperation (IICA): Economic and Social Relevance of Central American Coffee Sector, September/December 1998, Promecafe Bulletin, Number 80.

ANNEX IV: Description of Production of Coffee

The major differences in production of coffee, and particularly processing, have to do with whether the coffee is an arabica or robusta, whether or not the beans are washed, as is seldom the case for the robusta variety. Since as a whole, the specialty coffee market consists of washed (or wet processed) arabica beans, and that wet processing is the norm for Mesoamerica, the project focuses exclusively on wet or "washed" coffee processing.

Increasing interest is being expressed in environmental impact of coffee growing and processing and the International Coffee Agreement of 1994 specifically requires its member countries to give due consideration to sustainable management of coffee resources and processing[6]. The major controversies involving issues of production and processing involve the following:

- the introduction of technified varieties of coffee engineered for higher yields (approximately 10% higher yields) and requiring full sun (or greatly reduced shade) and high inputs of fertilizer and pesticides;
- the contamination of water in coffee processing;
- the use of wood for fuel in coffee drying, contributing significantly to deforestation;
- the exploitation of coffee workers, particularly by large land owners;
- and the exclusion of small growers from direct access to markets.

The coffee production and processing includes the following steps:

Harvest Stage: Coffee cherries are selectively harvested by hand, individual cherries ripen at different rates resulting in several peaks throughout the several months of the harvest. For quality, only ripe cherries should be picked.

Wet Processing (Pulp Removal and Bean Washing): The coffee cherries are brought to a wet processing mill, or beneficio, near the plantation site where the cherries are depulped using a mechanical depulping machine to remove the pulp that surrounds the seeds or beans within. These machines range from small hand powered devices to gas and diesel run systems for large volumes.

The beans are then "washed" in fermentation tanks. This process removes the last layer of pulp or mucilage from the bean. The fermentation period is critical for quality, too much time in the fermentation tanks and the over-ferment, resulting in a distinctly recognizable poor flavor.

The beans are then usually pre-dried for a brief period on a patio to reduce their weight in preparation for transport to a centralized drying facility.

It is during the wet processing phase that water contamination occurs as vast amounts of pulp and wastewater from fermentation tanks are dumped into mountain streams and rivers. As this organic matter is broken down, the oxygen is depleted, resulting in lifeless streams and rivers.

[6] The International Coffee Organization (ICO), International Seminar on Coffee and the Environment, London, May 1996.

While the coffee is wet, it is particularly vulnerable to contamination by mold or bacteria. The coffee must be dried in a matter of days at most. During transport to and queue at the drying facility is often a source of problems affecting quality.

Dry Processing (Drying, Storage, Milling, and Sorting): The washed beans are transported to centralized drying facilities where they are dried in large mechanized (three stage) dryers using wood (typically) or fossil fuel. Coffee from several plantations, or even an entire region is mixed in these facilities.

The dried coffee is sorted or graded, either by hand or machine, separating the beans according to size, density, and sometimes color. The beans are stored, usually in parchment form (dried coffee with the husk still intact) in silos and warehouses. The final stage is the milling or removing of the parchment or husk by a milling machine. The result is green coffee ready for export. The coffee is shipped in 100 lb. or 150 lb. Sacks.

ANNEX V: The International Market for Sustainably Produced Coffee and Allspice

Coffee:

Coffee is one of the world's major crops both in terms of its worldwide role as a beverage and of its economic importance as a source of foreign exchange and cash income for producing countries. While agriculture's share of total exports has been declining in Mexico and Central America with the emphasis on developing free trade zones for the manufacture-for-export (maquila) industry, coffee's proportional contribution to the agricultural sector's earnings has remained unchanged.

Coffee is produced in more than 60 countries and it is estimated that some 25 million individuals, second only to oil, are employed by this highly traded commodity.[7]

From 1950 to 1990 coffee production increased 183% to 6,282,000 metric tons with Mexico (7 %), Central America (10.8%), the Caribbean (2.2%), and Colombia (13.5%) accounting for 33.5% of the world's production. For this region as a whole, coffee covers 44% of the "permanent cropland," agricultural land devoted to perennial crops and excluding pasturelands for livestock. World production for 1994 was 5,628,000 metric tons.

"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% above the lower quality robustas or unwashed arabicas, coffees produced for mass consumption."[8]

These sources of high-quality coffee are increasingly sought after to satisfy the growing specialty coffee market. In the US, this market is projected to reach $3 billion dollars by 1999 of specialty coffee sold for home consumption, and combined with $1.5 billion in retail food service sales, the specialty coffee industry will approach $5 billion by the turn of the century.[9] Of the projected 21 million sacks of coffee purchased for the US market in 1998, approximately 16% will be for the specialty market: 3.5 million sacks accounting for just under 30% of household consumption and approximately 8 percent of food service consumption[5]. The specialty market has nearly doubled over the course of the past ten years.

The Specialty Coffee Association of America (SCAA), notes that the specific geographic location of the coffee's origin, not simply the country of origin, will play a key role in product marketing. Along the same lines, the method of processing (such as wet versus

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[7] The Coffee Lover's Companion, Diana Rosen, 1997, Birch Lane Press.

[8] Coffee, Conservation, and Commerce in the Western Hemisphere: How Individuals and Institutions Can Promote Ecologically Sound Farming and Forest Management in Northern Latin America, Robert A. Rice and Justin R. Ward, Smithsonian Migratory Bird Center and the Natural Resources Defense Council, Washington, DC, June 16, 1996.

[9] Avenues for Growth: A 20-Year Review of the US Specialty Coffee Market, Specialty Coffee Association of America, January, 1993.

dry) will also determine which coffees are selected for the specialty coffee market. The Environmental Committee of SCAA has endorsed the Solar/Biomass Coffee Drying System.

The success of organically grown coffee will continue and according to SCAA its availability will be the only limiting factor. Another continuing trend will be the growth of "micro-roasteries," topping 1,400 by 1999. These retail roasters will greatly influence coffee marketing, shaping both consumer opinion and choices in specialty coffee categories:

Their face-to-face dealings with consumers and their ability to make rapid changes in their product lines put retail roasters in position to discover which product "permutations" become hot sellers.[10]

The specialty market is demanding new sources of high-quality, individualized coffees. According to Judith Ganes, a senior commodity analyst with Merrill Lynch & Co. who specializes in the coffee industry: "There's still a shortfall of high quality coffee."[11]

These established trends are important for the successful introduction of solar-dried coffee. The standalone, off-grid Solar/Biomass Coffee Drying Systems, unlike any other dryer on the market, can operate in remote areas. For the typical small grower who does not have drying capability, the solar dryer is a tool that breaks down the most stubborn barrier to advancing up the "value-added" chain. Dry beans can be sold for many times the value of wet beans, and unlike wet beans that must be sold in a matter of days, dry beans are stable and can be stored giving the grower greater flexibility in timing the sale of the harvest.

Because the coffee is dried at the plantation site and not mixed at a centralized processing facility, as is usually the case, the coffee can be "individualized" or characterized according to variety, altitude, plantation, date of harvest etc. This capability to isolate the harvest is a necessary step in establishing a quality baseline that will make the small grower eligible to sell on the specialty market.

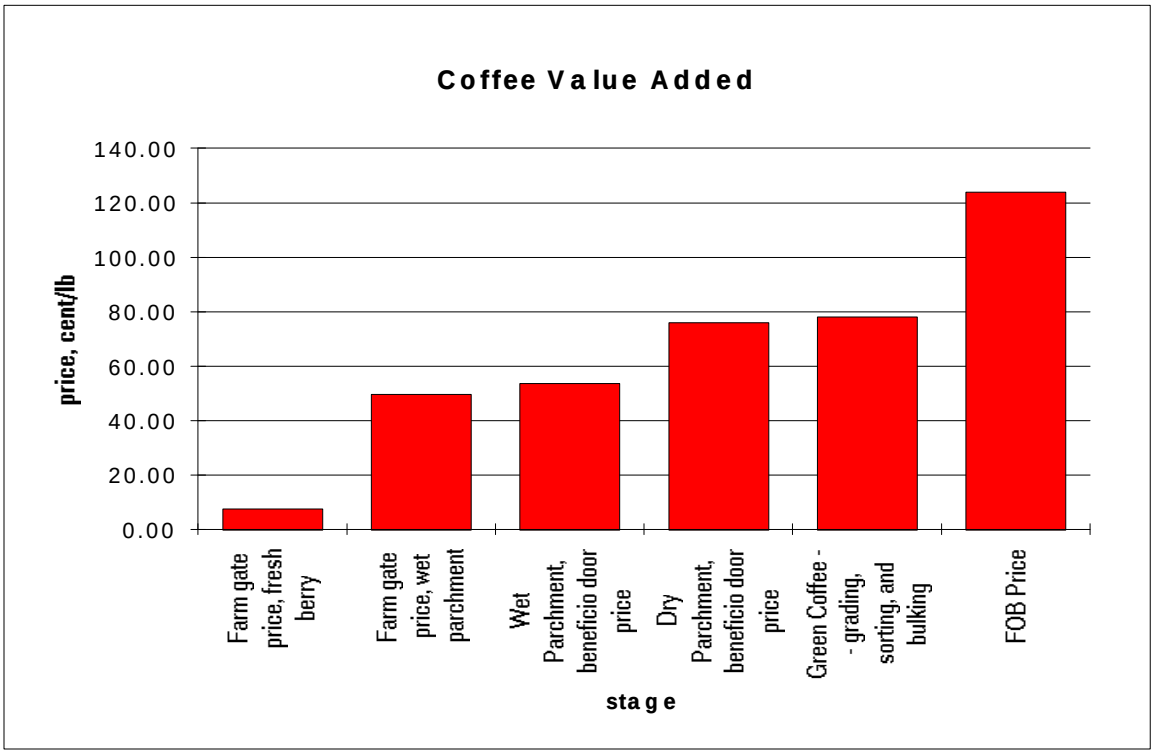
MDI's marketing pilot for Café Solar®, in which we introduced solar-dried coffee to several specialty coffee roasters, reinforces the power of retail roasters to influence consumer trends. MDI conducted several training seminars for store managers, sales people, and marketing developers for Green Mountain Coffee Roasters of Vermont, Merchants of Green Coffee in Toronto Canada, and a small roaster in Westford MA, Browse and Beans. In each case, the sales force was eager to promote the "story" of solar-dried coffee, including the social and environmental benefits the dryer allows. Customers responded very favorably, often requesting the product. Response for Browse and Beans was so positive, they switched to café solar® after it became their best selling coffee. They have successfully introduced this coffee to two other stores for which they roast. Green Mountain produced special packaging to reflect the use of renewable energy in processing and identified the cooperative that produced the coffee.

[10] Ibid.
[11] *The Boston Globe*, July 24, 1997.

MDI believes that similar to organic coffee, the only limiting factor for moving café solar® into the specialty market, provided the proper marketing outreach and training is conducted, is its availability.

The foundation and rationale of this proposed project rests on the capacity of productive applications to provide greater returns to the producers through capturing the added value that processing and direct access to international markets allow.

The following graph illustrates the advantages of both selling dried coffee versus wet parchment and in selling to the specialty market versus the New York-based market. Without the ability to dry their production, small growers must sell at either the first two stages of the value-added chain: fresh berry (7 to 10 cents/lb.) or wet parchment (around 52 cents/lb.). With the drying systems, these growers can sell dry parchment at New York-based prices (around 76 cents/lb.) and with access to the specialty coffee market, at the last stage in the value added chain for (around $1.20 to $1.35/lb.). Due to the cyclical nature of the coffee market, we have used the lower, more representative (and conservative) prices for the sake of analysis.



Allspice:

An international market exists for high value-added products derived from the berries and leaves: essential oil for medicines, cosmetics and food preservation; and ground allspice for the baking industry and domestic culinary use. Though the fastest growing market is for essential oils for the aromatherapy industry.

Two highly value added allspice products are traded internationally. The fruit, which are generally dried and ground or distilled for oil, and the leaves, which are also distilled for oil. The ground fruit is used as a flavoring and curing agent for the fish, meat, and baking industry, and also as a condiment for domestic culinary use. The essential oil contains eugenol, which is used in medicine as a stimulant and aromatic, and is largely employed as a flavoring[12] Some literature prescribes allspice as an aphrodisiac.

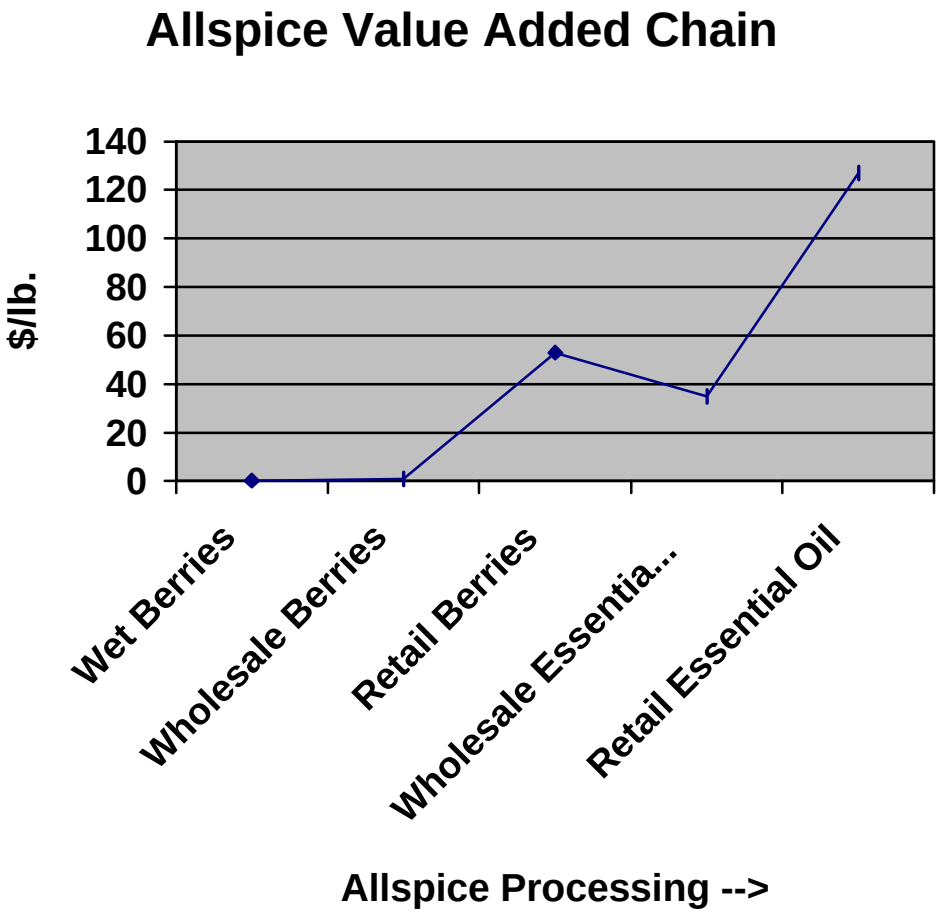
According to India's Research Institute for Fragrance Materials, the essential oil industry has enormous scope for growth and to provide employment opportunities for rural poor and to provide foreign exchange. According to the US Department of Agriculture, US exports of essential oils for FY 1998 were $533 million. Imports of essential oils from primarily tropical developing nations to the US in 1998 were 38,030,199 Kg with a declared value of $332,726,344.

In an initial survey of allspice distributors, several contacted expressed strong interest in purchasing allspice essential oil from producers in this project and have supplied letters of intent.

The following table and graph illustrates the advantages of selling dried allspice berries and allspice essential oil from berries and leaves on the international market versus raw product to local intermediaries. Without the ability to process their production, harvesters must sell at the first stage of the value added chain: fresh berries or leaves for approximately 0.11 $/lb. Dried berries on the New York Spot Market averaged 0.98 $/lb. for the past four years. Processed whole berries retail for over $53.12 $/lb. Allspice essential oil wholesales for between 33.00 and 42.00 $/lb. and retails for 127.04 $/lb. In this analysis, the participating group will sell at the wholesale level for allspice essential oil after purchasing the necessary processing equipment.

Local Allspice Harvesting to Intermediaries	0.11 $/lb.
Wholesale Prices for Dried Allspice Berries(New York Spot Market)	0.98 $/lb. (average over last 4 years)
Retail Price for Allspice Berries	53.12 $/lb.
Wholesale Price for Allspice Essential Oil	33.00 to 42.00 $/lb.
Retail Price for Allspice Essential Oil	127.04 $/lb.

[12] Of Herbs and Spices, Abelard-Schuman, London, NY, Toronto


Allspice Value Added Chain
$/lb.
140
120
100
80
60
40
20
0
Wet Berries
Wholesale Berries
Retail Berries
Wholesale Essentia...
Retail Essential Oil
Allspice Processing -->

ANNEX VI: Co-financing Partners

The following organizations are co-financing partners and will provide loans to the cooperatives for the purchase of equipment and/or short-term financing of harvest costs. The business plans for each enterprise were prepared in accordance to their requirements.

Ecumenical Cooperative Development Society (SOCED), recently renamed to Oikocredit—Established in 1975 with support from the World Council of Churches, Oikocredit provides over $20 million in loans in Central American and the Caribbean. The organization is keenly interested in the project and in providing credit for solar coffee drying systems regionally. They are also interested in financing the coffee harvest for the participating cooperatives. Oikocredit provides loans from US$60,000 to US$750,000 at 10 percent interest rate for periods of 5 t 10 years. The regional manager and contact for this program is Teresita Murillo in Costa Rica, edcscr@sol.racsa.co.cr.

Institute for Rural Development (IDR)—The IDR program in Nicaragua is funded by the Interamerican Development Bank ($40 million and $30 million in the past two years). The program can provide up to 90% financing for projects up to $300,000 per project. The director of the program is Ruth Ramirez Amador,
Managua, Nicaragua (506) 228-1395, Diplan@ibw.com.ni.

Institute for International Cooperation (IIZ)—Austrian based institute is providing a US$50,000 loan for the group in Boaco. This portion of funding for Boaco has been approved. The IIZ loan rates are 10% with a one (possibly more) grace period. The contact for the program is Eduardo Zamora, Asesor Tecnico
Intituto para la Cooperacion Internacional, Managua, Nicaragua, (505) 268-0119, iiznic@nicarao.org.ni.

Interamerican Development Bank—The bank is currently working with the coffee cooperatives in the project through a café forestal program aimed at expanding organic and shade coffee production in the target region. The bank recommends their IDR program as the best match for equipment financing. Contact: Jaime A. Cofre Camuzzi, Sector Agricultura y Recursos Naturales Banco Interamericano de Desarrollo Managua, Nicaragua, (506) 267-0831, jaimeco@iadb.org.

The Canadian International Development Agency (CIDA)—CIDA will provide a short documentary-style video that will be used to promote coffee sales from the project.