PD-ABI-523

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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

BOLIVIA

PROJECT PAPER

SUSTAINABLE FORESTRY MANAGEMENT

AID/LAC/P-910

PROJECT NUMBER: 511-0621

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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete)

Amendment Number

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: BOLIVIA

3. PROJECT NUMBER: 511-0621

4. BUREAU/OFFICE: LATIN AMERICA & CARIBBEAN (LAC) 05

5. PROJECT TITLE (maximum 40 characters): SUSTAINABLE FORESTRY MANAGEMENT

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 00

7. ESTIMATED DATE OF OBLIGATION (Under 'B', below, enter 1, 2, 3, or 4)

A. Initial FY 93 B. Quarter 4 C. Final FY 99

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	C. L/C	D. TOTAL	LIFE OF PROJECT E. FX	F. L/C	G. TOTAL
AID Appropriated Total						
(Grant)	(2,968)	( )	(2,968)	(15,000)	( )	(15,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country						
Other Donor(s)		701	701		5,000	5,000
TOTALS	2,968	701	3,669	15,000	5,000	20,000

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH CODE 1 Grant	2 Loan	D. OBLIGATION TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) E/NR									
(2)						2,968		15,000	
(3)									
(4)									
TOTALS						2,968		15,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE COD

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	ENV	RGEN	BR				
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

To build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use.

14. SCHEDULED EVALUATIONS

Interim MM 09 YY 96 | MM 09 YY 98 Final MM 06 YY 00

15. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [ ] 941 [X] Local [ ] Other (specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment.)

The USAID Controller has reviewed the financial procedures described herein and hereby indicates his concurrence.

Richard J. Goughnour, Controller

17. APPROVED BY

Signature

Title: Garber A. Davidson, Acting Mission Director

Date Signed: 8/25/93 (MM DD YY)

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION (MM DD YY)

AID 1330-4 (3-89)

PROJECT AUTHORIZATION

Name of Country: **BOLIVIA**

Name of Project: **BOLIVIA SUSTAINABLE FORESTRY MANAGEMENT**

Number of Project: **511-0621**

1. Pursuant to Sections 103, 103A, 117, 118 and 119 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Bolivia Sustainable Forestry Management Project (the "Project") for the Republic of Bolivia (the "Cooperating Country") and Non-Governmental Organizations in Bolivia ("NGOs") involving planned obligations of not to exceed Fifteen Million United States Dollars ($15,000,000) in grant funds (the "Grant") over a seven period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project. The planned life of the Project is approximately seven years from date of initial obligations until September 30, 2000.

2. The goal of the project is to reduce degradation of forest, soil, and water resources and to protect the biological diversity of Bolivia's forests. The purpose is to build Bolivian public and private sector capacity to develop and implement programs for sustainable forest use. The Project will be organized into three components and three supporting elements. The components are: natural forest management (including biodiversity protection, and technology transfer), product development, and policy and institutional analysis and development. The supporting elements include research, training, environmental monitoring and evaluation, and communications. The Project will be implemented by several public and private sector Bolivian organizations. A U.S. consortium will provide technical assistance.

3. The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services

Commodities financed by A.I.D. under the Project shall have their source and origin in Bolivia or the United States except as A.I.D. may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Bolivia or the United States as their place of nationality, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States of America.

b. A.I.D. shall reserve approval rights over key GOB personnel involved in Project implementation, as a condition precedent to payment of salaries in local currency with Grant funds.

c. The GOB shall agree to work with community and private group and organizations to assure access to land for pilot and demonstration activities, to use its best efforts to present and urge the passage of a new forestry law supporting sustainable forest use, and to establish in Bolivia an

independent, internationally recognized organization or agency capable of certifying sustainable forestry use and practices.

4. Based on the financial plan and the description of project activities and implementation arrangements in the Project Paper, local cost financing with appropriated funds is hereby authorized for the Project, as necessary to fulfill program objectives and to best promote the objectives of the Foreign Assistance Program.

Garber A. Davidson
USAID/Bolivia Acting Director

SA, RLA:nec - August 24, 1993
Clearances:
ARD:JCalvo (in draft)
ARD:MYates (in draft)
ARD:WBaucom 8/24/93
A/PD&I:MBarash (in draft 8/23/93)
ECON:KBeasley (in draft 8/20/93)
RCO:MKidd (in draft 8/20/93)
DP:ESzepesy 8/24/93
CONT:RGoughnour
A/DD:LLucke

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ACRONYMS

AAAS	American Association for the Advancement of Science
AID/R&D/ENR	Agency for International Development/Research & Development/Environment & Natural Resources
AID/EID	Economic & Institutional Development
AID/W	Agency for International Development/Washington
APCOB	Apoyo Para el Campesino Indígena del Oriente Boliviano.
APCOP	Ayuda Para el Campesino Boliviano
APG	Asamblea del Pueblo Guarani
ARD	Agricultural and Rural Development Office
B/C	Benefit/Cost
BOLFOR	Sustainable Forestry Management Project
BOSCOSA	The Osa Peninsula Forest Management and Conservation Project
CARANA	CARANA
CATIE	Centro Agricola Tropical de Investigacion y Extension
CDC	Centro de Datos para la Conservación
CDF/SC	Forestry Development Center/Santa Cruz
CEQ	Council on Environmental Quality
CESC	Coordinadora Etnica de Santa Cruz
CI	Conservation International.
CICOL	Central Intercomunal Campesina del Oriente de Lomerio
CIDOB	Confederación de Indígenas del Oriente Boliviano
CIMAR	Centro de Investigación y Manejo de Recursos Naturales
CIRABO	Central Indigena de la Region Amazonica
CITES	Convention International Trade in Endangered Species
CNF	Cámara Nacional Forestal National Forestry Chamber of Commerce)
CODEMA	Consejos Departamentales del Medio Ambiente
COP	Chief of Party
CORDECRUZ	Corporación de Desarrollo de Santa Cruz
CORDEP	Cochabamba Regional Development Project
COTESU	Cooperación Técnica Suiza (Swiss Technical Cooperation)
CUMAT	Capacidad de Uso Mayor de la Tierra
DA	Development Assistance
DAI	Development Associates Incorporated
DAP	Design and Performance
EA	Environmental Assessment
EOPS	End of Project Status
ER	Environment Review
FY	Fiscal Year
FAN	Fundación Amigos de la Naturaleza
FAO	Food and Agriculture Organization
FBX	Fundación Bolivia Exporta
FONAMA	Fondo Nacional para el Medio Ambiente (National Environmental Fund)
FORESTA	Forestry Project Costa Rica
FSC	Forest Stewardship Council
FX	Foreign Currency - Moneda Extranjera (US$)
GEF	Global Environmental Facility
GOB	Government of Bolivia
IDB	Interamerican Development Bank
IIB	Instituto Indigenista Boliviano
INIF	Instituto de Investigaciones Forestales
IRR	Internal Rate of Return

ITTO	International Tropical Timber Organization
L/COM	Letter of Commitment
L O P	Life of Project
LT	Long Term
LAC/DR/E	Bureau for Latin America and the Caribbean/ Development Resources/Environment & Energy
LAC	Latin America and the Caribbean Bureau
LC	Local Currency - Moneda Local (Bs)
M & E	Monitoring and Evaluation
MACA/CDF	Ministry of Agriculture and Campesino Affairs/Forestry Development Center
MDSMA	Ministerio de Desarrollo Sostenible y Medio Ambiente
MEO	Mission Environmental Officer
MIS	Management Information System
NEPA	National Environmental Policy Act
NFM	Natural Forest Management
NGO	Non Governmental Organization
NPV	Net Present Value
NTFP	Non Timber Forest Products
ODA	Overseas Development Agency
ONG	Organización No Gubernamental
OP/PS/OCC	Office of Procurement/Overhead/Special Costs & Close Out
PAAB	Plan de Acción Ambiental de Bolivia (Bolivian Environmental Action Plan)
PAFT	Plan de Acción Forestal Tropical (Tropical Forestry Action Plan)
PID	Project Identification Document
PIO/C	Project Implementation Order/Commodities
PL-480	Secretaría Ejecutiva Programa de la P.L - 480 (Executive Secretariat, PL-480)
PP	Project Paper
R&D	Research and Development
RENARM	Regional Natural Resources Management (Central America)
RIG/A/T	Regional Inspector General
ST	Short-Term
SEDEMAS	Secretarías Departamentales del Medio Ambiente.
SENMA	Secretaría Nacional del Medio Ambiente (National Secretary for the Environment)
SENMA/SC	Secretaría Nacional del Medio Ambiente en Santa Cruz
SNAP	Sistema Nacional de Áreas Protegidas
SUBIR	Sustainable Use of Biological Resources Project (Ecuador)
TA	Technical Assistance
TSC	Tropical Science Center
UAGRM	Universidad Autónoma Gabriel René Moreno
UNDP	United Nations Development Programme
US	United States of America
USAID	United States Agency for International Development
WB	World Bank
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund

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SUSTAINABLE FORESTRY MANAGEMENT

PROJECT No. 511-0621

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SECTION I
EXECUTIVE SUMMARY

The rate of decline in Bolivia's forest resources is alarming, and demands priority attention. Deforestation and forest degradation are widely recognized as Bolivia's most urgent environmental concerns, and estimates on the destroyed area of economically valuable forests range as high as 200,000 hectares/year. While the export market for Bolivian forestry products is growing rapidly, three species dominate nearly 90 percent of the timber trade. Mahogany alone accounts for fully 72 percent of total timber value, though stocks are being depleted rapidly, and may last less than a decade at current rates of extraction. Despite this, experts estimate that more than 50 percent of total timber cut is wasted through irrational harvesting and cutting practices, and secondary timber species are almost ignored.

This bleak situation is made even more dismal with the marketing of large quantities of high-value hardwoods as unprocessed wood, with little value-added processing in country. In effect, this adds up to a situation where increasingly scarce tropical hardwoods are being extracted at often extremely high costs—ecological, economic, and social—yet are typically being sold for only a fraction of their potential value.

The situation with non-timber forest products is similar. For example, while exports of Bolivian Brazil nuts reached $12 million in 1991, virtually all this production was exported with only minimal value-added processing. More ominous is the lack of knowledge and informed management of the country's current Brazil nut stands, with preliminary scientific evidence suggesting little or no natural regeneration of these valuable trees in Bolivia's primary forests. Even less is known about a host of other potentially high-value and renewable secondary forest products (e.g., essential oils, cosmetics, fruits, gums and medicinals, and selected fauna) that could dramatically increase the value of the standing forest.

This almost uncontrolled forest exploitation is also having severe impacts on the country's biological diversity. While Bolivia possesses more than 18,000 species of vascular plants, great primate diversity, and one of the largest numbers of terrestrial bird species in the world, habitat destruction, hunting, and illegal trade in live animals and skins is quickly destroying this rich resource base.

A key technical constraint to alleviating these problems is the lack of both ecological and silvicultural knowledge to design sustainable natural forest management (NFM) practices. While it is possible to design improved NFM management systems on the basis of field experience in other tropical and sub-tropical forests, there is no assurance that these will be

economically or environmentally sustainable in Bolivia. Therefore, an important part of this project will be to conduct the studies needed to design, test, and diffuse these management systems.

The focus of this project is eco-certification, here defined as a statement by a recognized independent authority that the forest product in question is extracted from a forest being managed in a sustainable manner. This project aims to have 25 percent of all hectares in forest production in Santa Cruz certified. In order to achieve this target the project will conduct research on the ecological, silvicultural, wildlife and sociocultural factors widely recognized as necessary to establish and apply standards for certification. It will build human capacity to design and implement programs for certified forest use, by 1) training professionals, students and forest technicians; 2) testing alternative forest management techniques to generate maximum incomes under certified forestry; 3) advising on forest management plans; 4) disseminating research and applied forestry management techniques to expand the area under certified management; 5) conducting economic and policy studies which should lead to an improved regulatory and investment environment for sustainable forest use, as well as improved enforcement of laws governing logging; and 6) assisting in commercialization of new certifiable products and establishment of new markets so that the economic value of the forest is increased and maintained far into the future.

The **goal** of the project is to reduce degradation of forest, soil, and water resources and to protect the biological diversity of Bolivia's forests. The **purpose** is to build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use. A number of end of project conditions will be achieved:

- 25 percent of all hectares in forest production in Santa Cruz certified as being managed sustainably.

- An internationally recognized mechanism is established and functioning effectively in certifying the sustainable production of timber and non-timber forest products.

- Suitable forestry law and/or regulations drafted with project technical assistance, and presented to the GOB by the MDSMA by 1996.

- GOB institutions capable of continuing with BOLFOR-initiated sustainable forestry and biodiversity protection activities. The new MDSMA has regional capacity in Santa Cruz to carry out its mandate; the CDF in Santa Cruz, or its replacement, will be performing effectively in its forest research and extension roles.

- A substantial body of applied research has been undertaken and published on tropical flora and fauna, ecology, product development and utilization, economics, and indigenous peoples technologies, including methodologies for determining sustainability and acceptable levels of impact, in order to allow for product certification.

- Forest management practices tested, evaluated and adopted by commercial foresters and community groups in different ecological settings. Sustainable forest use programs being implemented by public and private organizations.

- New markets developed for certified timber and non-timber forest products.

- A cadre of Bolivian professionals and technicians (foresters, forest ecologists, wildlife specialists, natural resource economists, biologists, etc.) capable of undertaking further work in BOLFOR initiated activities, working in the certification entity, the forest industry, the GOB, and Bolivian universities.

The sites tentatively selected for the project's initial pilot activities are located in the Department of Santa Cruz and include a subtropical moist forest concession of 150,000 hectares managed by a private sector operator and an area of subtropical dry forest where the Chiquitano indigenous community manages 30,000 hectares. These sites will be used for long-term research and training activities, and in this way will play a key role in developing and disseminating improved forest management practices for the Bolivian lowlands.

The project is organized into three components and three supporting elements, as follows.

Natural forest management component. This component is designed to produce the ecological, economic, technical, and social information needed to define and implement sustainable forestry management plans. It will: 1) establish what forest products can be harvested sustainably; 2) explore means to increase forest yields within the limits imposed by the need to conserve biodiversity; 3) define forest-type and site specific detailed certification requirements; and 4) test and transfer sustainable forest management technologies.

This component's training and technology transfer activities will develop a cadre of professionals capable of addressing the spectrum of natural forest management problems. It will inform opinion makers on the major tropical forestry management issues, preparing them to make full use of the policy, ecological, institutional, and silvicultural analyses that BOLFOR produces. A primary result of the project will be enhanced human capacity to protect and manage Bolivia's forests.

Policy and institutional analysis and development component. This component is designed to produce the information needed to create a favorable policy environment for the adoption of sustainable forestry management plans by the industry and to strengthen key public sector institutions in their ability to implement these policies. This component will: 1) study the economics of forest production and management; 2) address forest policy issues; and 3) strengthen key GOB institutions at the local level in their ability to formulate and enforce policies. This will involve policy analysis and dialogue, and targeted institutional

analysis and development (including assistance to establish a mechanism to certify forest products).

Product development component. This component focuses on those activities that are needed to increase the value and volume of timber and non-timber products harvested from the forest, in order to increase the value of the forest and thereby discourage forest conversion. A major focus will be on "green" marketing (i.e., certified products sold to environmentally conscious retail or wholesale buyers and consumers). This will include:

- Green marketing of traditional timber species from sustainable management systems, and increased value added processing.

- Development of expanded markets and increased value from non-timber products currently harvested and marketed, as well as potential development of new non-timber products.

- Technical assistance to enterprises in the timber and non-timber industry to improve production, processing, and marketing capacities, and as necessary to meet the income and foreign exchange objectives of the project.

Supporting elements. The three supporting elements are: research coordination, training coordination and environmental monitoring, evaluation and communications. These elements will provide cross cutting support to the staff in the project's three components, to help them better achieve the objectives of sustainable forest use. They will also provide linkages to the universities for student researchers; maintain and update baseline data; monitor project results; assist in publication of research papers; disseminate project information; and establish and maintain the project's communications network and computerized data bases.

The activities that will determine the ecological sustainability and the economic viability of forest production and management are <u>core</u> activities and they will take place in phases I and II of the project (see phasing below). Determination of the sustainability of a product will define the activities that follow, such as transferring production technologies, assisting entrepreneurs to meet certification requirements, and accessing markets. These activities can be considered <u>**conditional**</u> and are planned for phase III of the project.

Project phasing. BOLFOR activities will be implemented in three phases over a period of seven years. Since establishing the sustainability of forest production is at the core of the project, for each specific forest product that BOLFOR studies and develops the sequence and timing of activities will be dictated by 1) what needs to be done to establish ecological soundness and economic viability, and 2) what needs to be done to communicate these findings to policy makers, regulators, and private entrepreneurs engaged in forest production. Parallel to this, BOLFOR will generate knowledge to inform policy and the expected formulation of a new forestry law and/or regulations, with the understanding that an

appropriate policy environment is essential if sustainable forest management is to be widely adopted in Bolivia.

The project will be phased as follows:

Phase I: years 1 and 2 - Laying the foundations for certification. Activities will include: data collection and basic research, initial research/demonstration sites established, economic and policy analysis underway, and initial training, all as necessary for forest products certification.

Phase II: years 3 and 4 - Implementing certification. Activities will include: environmental impact assessments for specific forest management plans, subsequent application of findings to selected commercial producers and additional demonstration sites, establishment of a certification mechanism, commercialization of a few timber and non-timber products, expansion of training, and publication of research results.

Phase III: years 5 to 7 - Broad dissemination and expanded opportunities. Activities will include: dissemination and expansion of sustainable forestry management to additional concessionaires, analysis of potential new sustainably harvested products, continued training and promotion of certifiable forest management practices.

The GOB will be the grantee. The project will be implemented by a U.S. consortium in close coordination with appropriate GOB agencies. Bolivia's new Ministry for Sustainable Develoment and the Environment (MDSMA) will be the key counterpart organization throughout the life of the project, and coordination with other relevant GOB agencies will be assured through its Secretariat for Promotion and International Cooperation. Other Bolivian organizations such as FAN, the CNF, and other groups will be involved as collaborators to the extent that such collaboration furthers project objectives. Technical assistance will be provided through an institutional contract with a U.S. consortium. This consortium will also manage the long and short-term training activities and procure technical commodities required for project implementation.

The organizational structure for the project will be comprised of an administrative directorate in the MDSMA and FONAMA. This office will facilitate administrative controls, fiscal coordination, and policy contacts with AID, the PL 480 secretariat, and other GOB and NGO entities. The project office in Santa Cruz will house the institutional contractor and local MDSMA staff, and will serve as the technical base for all activities, as well as for coordination with private sector producers and local NGOs. Administrative and advisory committees will provide general oversight and direction to the project. An annual planning process will be established to systematically review the previous year's experiences, assess progress against objectives, examine adherence to the requirements and mitigation measures recommended by the environmental assessments, program research and training activities, examine funding needs, and formulate future targets.

The project is budgeted at $20 million over a seven-year period. Funding will be provided through a $15 million development assistance grant and $5 million in local currency funds from the PL 480 secretariat.

SECTION II
PROJECT RATIONALE AND BACKGROUND

A. Perceived Problem

The rate of decline in Bolivia's forest resources is alarming, and demands priority attention. Deforestation is widely recognized as Bolivia's most urgent environmental concern (SENMA 1992:26), and estimates on the destruction of economically valuable forests range as high as 200,000 has/year (FAO 1991). While the export market for Bolivian forestry products is growing rapidly, three species dominate nearly 90 percent of the timber trade. Mahogany (Swietenia macrophylla) alone accounts for fully 72 percent of total timber value, though stocks are being depleted rapidly (e.g. the International Tropical Timber Organization (ITTO) estimates that in the Beni, one of the few remaining areas of the country with significant amounts of mahogany, stocks will be depleted in just five to seven years at current rates of extraction). Despite this experts estimate that more than 50 percent of total timber cut is wasted through irrational harvesting and cutting practices, and secondary timber species are almost ignored.

This bleak situation is made even more dismal with the marketing of large quantities of high-value hardwoods as unprocessed roundwood or rough sawn cants, with little value-added processing in country. In effect, this adds up to a situation where increasingly scarce tropical hardwoods are being extracted at often extremely high costs -- ecological, economic, and social -- yet are typically being sold for only a fraction of their potential value. It is increasingly clear that the nation's rich forest resources -- as well as the forestry sector's important and growing contributions to the country's foreign exchange earnings -- will be only short-lived unless sustainable forestry practices replace current wasteful ones.

The situation with non-timber forest products is similar. For example, while exports of Bolivian Brazil nuts reached U.S. $12 million in 1991, virtually all this production was exported with only minimal value-added processing. More ominous is the lack of knowledge and informed management of the country's current Brazil nut stands, with preliminary scientific evidence suggesting little or no natural regeneration of these valuable trees in Bolivia's primary forests. This suggests that -- under current management conditions -- the long-term sustainability of this important source of rural income is in jeopardy. Of course, even less is known about a host of other potentially high-value and renewable secondary forest products (e.g. essential oils, cosmetics, fruits, gums and medicinals, as well as selected fauna) that could dramatically increase the value of the standing forest.

This almost uncontrolled forest exploitation is also having severe impacts on the country's biological diversity. While Bolivia possesses more than 18,000 species of vascular plants, great primate diversity, and one of the largest numbers of terrestrial bird species in the world, habitat destruction, hunting, and illegal trade in live animals and skins is quickly destroying this rich resource base. The International Union for the Conservation of Nature

(1982) estimates that fully 20% of the country's biological diversity will be lost by the end of this decade. Natural forest management could play a critical role in protecting these important resources.

The situation is no better with regard to soil and water resources. Fully 30-40% of the country is experiencing significant levels of soil erosion, and the lack of forests on steep slopes, in particular, is leading to ever more rapid soil and water loss. Comprehensive watershed management is almost unknown, and current forestry policies and practices continue to encourage forest conversion for short-term gain. These patterns of forest use can be expected to continue unless private producers are offered alternatives for more sustainable forest management. The capacity to identify and implement such alternatives is now sorely lacking in Bolivia, and the assistance that would be provided by the Sustainable Forestry Management project is therefore needed urgently. Action must be taken now to reverse these harmful trends.

B. Mission's Strategy and Project Approach

One approach increasingly being looked to as "a promising alternative for...reducing deforestation" (World Wildlife Fund 1991:v) is natural forest management (NFM). Attempting to mimmick natural processes to achieve sustainable production of high-value forest products with little or no ecological disturbance, natural forest management:

> ...maintains continuous natural tree cover on forested land, introduces silvicultural and harvesting practices that increase the amount and value of products removed from the forest, maintains the capacity of the forest to regenerate naturally, and can be practiced in primary or secondary forests. While timber may be the predominant product of NFM, natural forests can also produce a wide range of other products including firewood, roofing thatch, cordage, ornamental and medicinal plants, fruits, nuts, resins, and fodder. NFM is particularly important as a tool for conserving the tropical forest ecosystems of Latin America, which contain exceptionally high levels of plant and animal diversity (World Wildlife Fund 1991:v).

Other approaches (e.g. establishment of protected areas, plantation forestry) can play important complementary roles in conserving vanishing forests and in protecting biological diversity. The Parks in Peril program, in particular, holds great promise for Bolivia, and the increasing emphasis now being given by the GOB to park protection (e.g. the new Sistema Nacional de Areas Protegidas, SNAP) is a welcome addition to resource preservation. However, it is clear that such activities can protect only a modest portion of Bolivia's total forest resources, and that opportunity costs (including for local area residents) associated with creating and protecting even more parks and reserves can be prohibitively high. Far more of the country's forest resources effectively rest in the hands of private producers (some 20% of the national territory, according to the FAO), though virtually nothing is being done to encourage these groups to use their forests (concessions and/or properties) more sustainably. Export levels for Bolivian forestry products are now booming however (estimated at U.S.

$75 million in 1991), and this sector -- if managed wisely -- could offer the country an important resource for long-term economic growth. However, it is clear that Bolivia's forests are now not being sustainably managed and that the changes required in current forest management will only come about if private producers have access to sustainable, economic alternatives. The need for this kind of assistance is both obvious and urgent, and this is the basic rationale for the Sustainable Forestry Management project.

C. Relationship to GOB Strategy

This project will play a major role in improving environment and natural resources management in Bolivia. In particular, its strong emphasis on developing capacities for environmentally sound and sustainable forest use will make it a timely and most welcomed lead player in Bolivian environmental affairs. This emphasis is fully consistent with GOB priorities, in particular with the Supreme Decree for an "Historic Ecological Pause" (halting all new timber concessions for five years, pending preparation of sustainable forestry management plans), the new General Law on the Environment (approved by the Congress and signed by the President in April, 1992), the pending Conservation of Biological Diversity law, and the environmental priorities of the Presidency of the Republic (as expressed in SENMA 1992). The project will also help the GOB implement its major Environmental Action Plan (the PAAB) in the forestry sector, as well as its Tropical Forestry Action Plan (now being developed with assistance from the FAO). It is also expected to provide valuable input into the planning and programming of the recently constituted Enterprise for the Americas Account through the National Environmental Fund (FONAMA).

Perhaps most important, the philosophy behind the project is strikingly consistent with the GOB's new institutional context, in particular with creation of a new Ministry of Sustainable Development and the Environment (MDSMA). BOLFOR's goals and objectives, and its rigorous attempt to balance issues of forest production and protection, nicely mirror key concerns in the new Ministry. The technical and institutional support the project will provide to the MDSMA will therefore be both critically important and timely.

D. Relationship to USAID/Bolivia Strategy

The Sustainable Forestry Management project will have the lead role in addressing USAID/Bolivia's new Strategic Objective to "Reduce Degradation of Forest, Soil and Water Resources and Help Conserve Biological Diversity." The project will be designed to direct itself explicitly to the key program output "Strengthen sustainable forestry, soils and water management initiatives."

In addition, the project will help USAID/Bolivia meet broader U.S., AID/W, and LAC Bureau objectives in the environment. For example, Congress has instructed A.I.D. to address protection of tropical forests and biological diversity (e.g. Section 118 of the Foreign Assistance Act, as amended), and these are central themes of the new project. It is also fully consistent with A.I.D.'s "Initiative on the Environment," supporting both of that document's

global priorities (environmental policy and economics, and strengthening environmental institutions) and two of the four priority problem areas identified by LAC (tropical forests and biological diversity, and watershed and water management). Similarly, it explicitly supports LAC objectives as presented in "Strategic Guidelines for Programming Assistance for Agricultural Development and Natural Resources Management: Latin America and the Caribbean" (12/92).

The project will directly support the LAC Bureau's priority to "Encourage Preservation and Sustainable Use of the Natural Resource Base." In particular, it will help "develop and distribute state of the art information on natural forest management to reduce tropical deforestation..." (LAC Bureau Program Objectives Implementation Workplan, 10/01/91, emphasis added), and could play a key role in encouraging an exchange of information with other relevant LAC projects (e.g. SUBIR in Ecuador, FORESTA in Costa Rica, RENARM in Central America).

E. Relationship to Current Mission Programs

The Sustainable Forestry Management project, while the centerpiece of the Mission's relatively new environmental Strategic Objective, will build on on-going activities of different USAID programs in Bolivia. In particular, project goals and objectives will complement the priorities of the new (March 1992) three-year PL-480 Title III agreement. These include strengthening the GOB's capacity to implement the five-year Historic Ecological Pause, and development of a plan to up-grade the country's forest ranger schools and the profession of forest manager. PL-480 will also help finance the drafting of new norms and regulations for an improved system for granting and managing forestry concessions. These activities will all help the Sustainable Forestry Management Project achieve its objectives, and project outputs, in turn, should help the PL-480 Title III program meet its own targets.

The Export Promotion Project has begun promising work with value-added processing of tropical hardwoods (e.g. finished doors and furniture), and the "lessons learned" in this context should be of utility to the Sustainable Forestry Management project. Similarly, the CORDEP project's experience (building on the work of the earlier Chapare Regional Development Project) with the identification, development, and marketing of new commodities should also give the new project an excellent point of departure.

Finally, the project will build on relevant locally and centrally-funded research already underway in Bolivia with leading NGOs (e.g. the Fundación Amigos de la Naturaleza's work in Noel Kempff Mercado and Amboró National Parks; The Wilderness Society's "Biological and Economic Analysis of Sustainable Selective Logging in Bolivia's Lowland Tropical Forests; or the Missouri Botanical Garden's support to the Herbario Nacional), thereby helping to consolidate the Mission's environmental portfolio. In this context USAID will also be able to improve coordination between the project and other relevant NGO activities

through its seat on the Administrative Council of the U.S.$21.8 million Enterprise for the Americas Account with FONAMA.

F. Other Donor Programs and Plans

This new project will also help USAID to coordinate more closely with other donors. For example, the Dutch (in collaboration with the International Union for the Conservation of Nature and Utrecht University) are funding some preliminary research in development of non-timber forest products, focusing on Brazil nut production in the Riberalta area of the Beni. The Germans (through the UNDP) will concentrate on improving forest management in the Chapare area (a potential site for the project's proposed secondary forest pilot area), in response to the deforestation being caused by agricultural expansion. Similarly, both the Swiss (through COTESU) and the FAO (through development of the Tropical Forestry Action Plan) are also committed to support more sustainable forestry use. Initial reactions in the broader donor community to this planned project have been very favorable, as have assessments of USAID's comparative advantage to play the lead role in this area.

The World Bank is also a key player in helping the GOB to develop its National System for Protected Areas (SNAP) program, with additional assistance from Switzerland, Germany and the PL 480 program (and with support expected from Holland for SNAP's endowment fund). The Bank is also currently considering a large effort to help Bolivia improve its agrarian reform and land tenure activities; one purpose of such assistance would be to encourage more sustainable resource use, including in the forested lowlands.

For the purposes of prioritizing actions, SNAP has divided these areas into three categories: 1) areas where "the potential for protection of ecosystems or representative natural areas is good" (11 areas with 6,918,000 has., including Amboró, Noel Kempff Mercado, Isiboro Securé and Pilón Lajas); 2) areas with high biological value, but ones where the potential for effective protection is lower (a total of 1,639,400 has., and including areas under private control, e.g., Ríos Blanco y Negro and Eva Mosetenes), and 3) areas with some known biological value, but ones for which inadequate information exists to assign them to categories A or B (2,692,300 has. total). This ambitious program will include funding for priority actions such as: 1) strengthening management capabilities, including training, control and monitoring; 2) establishing infrastructure for 9 protected areas, including two new areas that are yet to be created; and 3) development of natural resources management projects in buffer zones, to relieve pressures on parks and protected areas.

Other donors are funding activities in national land use planning, in particular the Inter-American Development Bank (in the departments of the Beni, Cochabamba, and La Paz), the Germans (in Santa Cruz and the Pando), and the Dutch (with an agroecological zoning project, and with a very interesting assessment of the ecology of Brazil nut production in the Pando that closely parallels AID-funded work with mahogany in the Bosque Chimanes). The Japanese Grant Facility is also channeling assistance to Bolivia through the World Bank, in particular for development of new environmental legislation (helping to fund

development of the new biodiversity law, the forestry law, and the regulations for the General Environmental Law), and for research on sustainable forestry management through the ITTO in Bosque Chimanes. The World Wildlife Fund is also developing a small but important forestry management training program, using resources made available through a commercial debt-swap (with the J.P. Morgan Bank) and through the National Environmental Fund. Initial discussions have already been held between USAID and WWF representatives in Washington and Santa Cruz, and close coordination on training activities is anticipated.

Finally, the Sustainable Forestry Management project could also help the U.S. meet its commitment to the new Global Environmental Facility, directly addressing two of the GEF's four priority areas (global warming and the destruction of carbon-absorbing forests, and destruction of biological diversity through degradation of natural habitats).

G. Lessons Learned

The design team paid special attention to lessons learned in several noteworthy natural forest management projects: the Plan Piloto Forestal in Quintana Roo (Yucatan, Mexico), the BOSCOSA project in the Osa Peninsula in Costa Rica, the Palcazu Project in Peru, and CATIE's San Isidro Demonstration Project, as well as the work done to date in the Chimanes Project in the Beni. They include the following:

- While the forestry profession has enough theoretical and practical knowledge of natural forest management to design management methods that have a high probability of success, specific management plans are likely to be as diverse as the forests themselves.

- Recognizing that forests convey important public benefits (e.g. conservation of biological diversity), support such as TA and training is likely to be needed to encourage investment in sustainable forest management.

- Tropical forest products are grossly undervalued throughout the tropics. The value of forest products is increased by primary processing and increased even more by secondary processing.

- One of the basic requirements for success in forestry is the assurance that managers will derive adequate economic benefits from their management efforts.

- Community based forestry which attempts value added processing probably works best if niche markets are targeted, rather than competing directly with larger scale operators in traditional markets.

- Natural forest management can be profitably conducted on tracts of land with limited agricultural potential.

- Forests throughout the tropics are threatened by governmental policies that encourage conversion regardless of use capabilities.

- There is need for further research on natural forest management and for training of forest managers, but enough is known to begin treating forest as a renewable and valuable resource.

These lessons are incorporated into the design of the project, which in addition to sustainable forest production includes a very specific and explicit focus on biodiversity protection. In this manner, BOLFOR takes an important next step beyond the platform built by the projects mentioned here.

SECTION III
PROJECT DESCRIPTION

A. INTRODUCTION

This section presents the goal, purpose, end of project status indicators, outputs and inputs of the project as well as a detailed description of project components and supporting elements. It also describes the participants and beneficiaries.

1. Project Goal and Purpose

The **goal** of the project is to reduce degradation of forest, soil and water resources and to protect the biological diversity of Bolivia's forests. The **purpose** is to build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use.

2. End of Project Status

A number of EOPS will be achieved:

- 25 percent of all hectares in forest production in Santa Cruz certified as being managed sustainably.
- An internationally recognized mechanism is established and functioning effectively in certifying sustainable production of timber and non-timber forest products.
- Suitable forestry law and/or regulations drafted with project technical assistance, and presented to the GOB by the MDSMA by 1996.
- GOB institutions capable of continuing with BOLFOR-initiated sustainable forestry and biodiversity protection activities. The new MDSMA has regional capacity in Santa Cruz to carry out its mandate; the CDF in Santa Cruz, or its replacement, will be performing effectively in its forest research and extension roles.
- A substantial body of applied research has been undertaken and published on tropical flora and fauna, ecology, product development and utilization,

economics, and indigenous peoples technologies, including methodologies for determining sustainability and acceptable levels of impact, in order to allow for product certification.

- Forest management practices tested, evaluated and adopted by commercial foresters and community groups in different ecological settings. Sustainable forest use programs being implemented by public and private organizations.

- New markets developed for certified timber and non-timber forest products.

- A cadre of Bolivian professionals and technicians (foresters, forest ecologists, wildlife specialists, natural resource economists, biologists, etc) capable of undertaking further research in BOLFOR initiated activities, working in the certification entity, the forest industry, the GOB, and Bolivian universities.

3. Expected Outputs

The outputs are extensive and detailed in the description of each project component, in the scope of work in the annexes, and in the logical framework.

4. Summary of Project Design

The collaborative process of developing this project with USAID, the GOB and the contractor team led to a design which retains the basic concepts outlined in the PID, because these concepts were found to be valid and appropriate. The design process also included non-governmental organizations, a select group of which will also be involved in project implementation.

Important institutional developments have taken place since initial project design. The new government of Gonzalo Sanchez de Lozada has decided to give greater weight to environmental affairs, and has created a new "super-Ministry" of Sustainable Development and the Environment (MDSMA) to accomplish that objective. This represents a major step forward in Bolivian environmental affairs, and provides an institutional context even more conducive to achievement of project goals and objectives than that under the previous administration. Creation of the new Ministry has drawn praise from many quarters, including from an environmental team sent down by Vice President Gore to help the Sanchez de Lozada government with transition planning. Of course, this new Ministry will benefit greatly from the technical and institutional assistance that BOLFOR will provide. Operationally, it has absorbed the functions of the National Environmental Secretariat (SENMA) and will house the National Environmental Fund (FONAMA), both of whom were intimately involved in BOLFOR project design (and originally envisioned to be the lead GOB entities for project implementation).

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An important aspect of this design work was the Environmental Assessment. Unlike many projects in which the EA is completed after design, this EA was undertaken at the outset so that information could be obtained and approaches agreed upon to preserve and protect the fragile environment of Bolivia's lowlands. These approaches are also aimed at leading to techniques which will improve the likelihood of sustainable harvesting and production of forest-based products and services. Thus, the research, training, natural forest management and monitoring/evaluation activities in particular have been structured based on the recommendations of the EA.

Another important aspect of the design was the process of site selection. Several meetings were held to identify candidate sites and formulate site selection criteria; data was collected, reviewed, and discussions held to select sites. Criteria included: good existing infrastructure and facilities, (relative) ease of access, high degree of biodiversity, existence of primary and secondary forest with a variety of potential timber and non-timber products, operating concessions, potential application to other parts of Bolivia, and presence of other donor and NGO interests and programs.

The sites evaluated were Alto Madidi, Bosque Chimanes, Manuripi Heath, Bajo Paragua (Moira site), Carrasco/Isiboro Secure, and the experimental forests of the Universidad Autónoma Gabriel René Moreno. After reviewing the information provided by the Centro de Datos para la Conservación (the CDC, contracted by Chemonics to assist with project design) the project team, with representatives from FONAMA, SENMA, and MACA (previously the three key GOB institutions collaborating on BOLFOR project design, prior to the change in government and creation of the new Ministry of Sustainable Development and the Environment) and the CDC, USAID, PL-480 and the Chemonics Consortium, selected Bajo Paragua in the Department of Santa Cruz as the project's initial comprehensive pilot site. Subsequent to the screening process, a complementary location in northeastern Santa Cruz Department was added. This was Lomerio, an area of dry forest where the Chiquitano indigenous community has some 30,000 hectares under management and has expressed strong interest in receiving training and technical assistance under BOLFOR. The Lomerio forestry project is being assisted by APCOB, a Santa Cruz based NGO and has been routinely applying timber stand improvement techniques of great interest to BOLFOR, such as liberation thinning. Lomerio offers a ready made site for assessing some of the forestry techniques BOLFOR will study.

Choice of a specific geographic area for the two pilot sites does not preclude work at other sites at a later date or implementation of specific, targeted activities (e.g. applied research) in other areas. Rather, this site specific focus was agreed upon by the design team because it allowed the EA to explore in greater detail the potential field-level impacts of project activities. Lessons learned during this process will help the project to more precisely define subsequent needs and opportunities as project activities are replicated or expanded into other areas of the Bolivian lowlands.

The two sites are representative of a broad range of conditions:

Moira	Lomerio
Large concessionaire	Organized indigenous community
Capital intensive	More labor intensive
Subtropical moist forest	Subtropical dry forest
Flat, soils from sandstone	Rolling, soils from granite
Fauna sporadically exploited	Fauna under constant pressure
Isolated from settlement	Amidst 32 settlements
About 600 km from Santa Cruz	About 200 km from Santa Cruz

The sites are similar in that they are both on the Brazilian Shield and exhibit related soil/topographic constraints on sustainable agricultural conversion. Both forests have been high-graded and subjected to sporadic burning. In this sense the forests are representative of millions of hectares of forest in Santa Cruz Department that are in need of ecological and economic rehabilitation. There is a real danger that such decapitalized forests will become eventual targets for inappropriate conversion.

A modest expansion of current activities for new research work in the Bosque Chimanes (associated with the ongoing work of Conservation International, or CI) will also be funded, in order to accelerate progress on certification. While no fixed timetable has been set, it is expected that in approximately 3-4 years, activities could be undertaken in Alto Madidi (selected as the second site for BOLFOR activities). This will be subject to evaluation of results and lessons learned.

Of special note in the design is an approach which includes national, departmental and local level activities. Ultimately, meeting the goal of this project will require concrete improvements in specific forest sites, and in the way Bolivia's natural forests are managed in general. At the same time, without national attention to policies which provide incentives for protection and production, these site-specific actions will fail. Thus, this project plans to work at the micro and macro levels, and examine the issues from a comprehensive and multidisciplinary perspective to reach its objectives.

5. Project Organization, Management and Coordination

a. Project Components, and Technical Assistance Team Organization and Management

The project is organized into three components and three supporting elements:

Components:

Natural forest management
Product development
Policy and institutional analysis and development

Supporting elements:

Research coordination
Training coordination
Environmental monitoring, evaluation, communications

The component units will report to an **administrative directorate** comprised of 1) an office within the MDSMA in La Paz, performing administrative and coordination functions and 2) the project office in Santa Cruz housing the institutional contractor and counterparts from the MDSMA and possibly the CDF/Santa Cruz (or a replacement entity, to be defined following government restructuring) forester counterpart.

The Santa Cruz office will be the operational headquarters for the project and will direct the **managerial and technical functions.** Throughout the life of the project, advisors may be temporarily placed in offices with other collaborating organizations when deemed necessary for achievement of BOLFOR's goal and purpose. The site in La Paz will assure administrative and fiscal coordination and policy contacts with AID, the PL 480 secretariat, and relevant GOB entities. The technical base in Santa Cruz is needed to be physically close to the primary implementing agencies, concessionaires, community groups and enterprises involved in forestry production.

The TA team will be headed by a **chief of party (COP)** who will have project management, information dissemination, and counterpart relations and coordination as primary responsibilities. The COP may also work in technical activities within one of the components as a member of a technical task force as appropriate. Changes in the composition of the technical assistance team will be approved by USAID/Bolivia.

The forestry profession has enough theoretical and practical knowledge of natural forest management to design management methods that have a high probability of success. Such methods are complex, however, and carrying out the activities planned for the project will demand the organization of the entire TA team into **multiple, multidisciplinary task forces.** Each task force will be headed by the specialist whose field constitutes the central focus of the activities assigned to the task force. For example in the Natural Forest Component, the biodiversity protection activities (research/training/monitoring) will be headed by the forest ecologist for the flora related activities and the wildlife specialist for the fauna related activities. Each task force may include some or all of the other specialists in

the team. The annual work plans will define what activities are undertaken by which task forces and with what resources.

Most BOLFOR activities include monitoring, research and training. In fact, some activities, such as biodiversity protection, are essentially the careful monitoring of impact of forestry and other human activities on the fauna and flora of the forest, its integrity, and its long-term sustainability. The information specialists will work with the technical specialists to set up component-specific monitoring systems, as well as uniform data storage and retrieval systems for use in project wide progress tracking and evaluations.

Based in the project management unit and under the overall direction of the COP, the **research, training, and logistics coordinators,** as well as the information specialist and other support staff, will provide support services to the three project components. The research and training coordinators will be MDSMA/Santa Cruz employees secunded to the project full-time and under the direct supervision of the COP.

b. Project Management, Coordination, and Administration

A **project administration committee**, consisting of the AID project manager, the PL 480 technical manager, the Subsecretary of State for Natural Resources in the MDSMA, the FONAMA Project Coordinator, and the contractor's chief of party, or their designees, will be established. This committee will provide general oversight and direction; resolve problems that occur, e.g. with administrative requirements or disbursements of local currencies; review and approve procurement of project commodities, etc. The committee will meet at least once every three months, unless additional meetings are requested by any member.

An **advisory committee** will review overall strategic direction of the project, examine critical research, environmental and policy issues, assess progress towards objectives against the work plan, bring lessons of experience from other countries and advise on future directions. It will be comprised of the ministers, directors or key technical specialists from Bolivian and U.S. organizations, such as the MDSMA, FONAMA, AID, one or two Bolivian and U.S. environmental NGOs and high level scientists knowledgeable of sustainable forest management and certification issues, and others that the committee may choose to invite. This committee will meet at least once each year.

The MDSMA will be the key counterpart organization throughout the life of the project. Staffing for the project's managerial and administrative requirements will be provided by the MDSMA and FONAMA in La Paz (coordinator, project officer, accountant, and secretary) and Santa Cruz (field representative) and the TA contractor in Santa Cruz (chief of party, administrator, project manager, secretaries, accountant, and office assistants).

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The MDSMA, as the GOB lead organization and PL-480 grantee will contract the research and training coordinators, and assign these full-time to the project and under the direct supervision of the COP. The policy analysts, monitoring and evaluation specialists (one each in the La Paz and Santa Cruz offices), and the forester (assigned to CDF or its replacement) will work with the TA team as counterparts in project technical tasks. It is anticipated that as these host-country counterpart MDSMA staff members undertake other responsibilities related to their departmental and national functions and roles, they will participate less intensively in project activities. At the same time, they will thereby be better able to incorporate BOLFOR's "lessons learned" into their own institutions, enhancing achievement of the BOLFOR project purpose. For example, by year four or five of the project the monitoring and evaluation specialists should be playing their roles on a departmental level, using both the technology developed and their on-the-job training while working with BOLFOR.

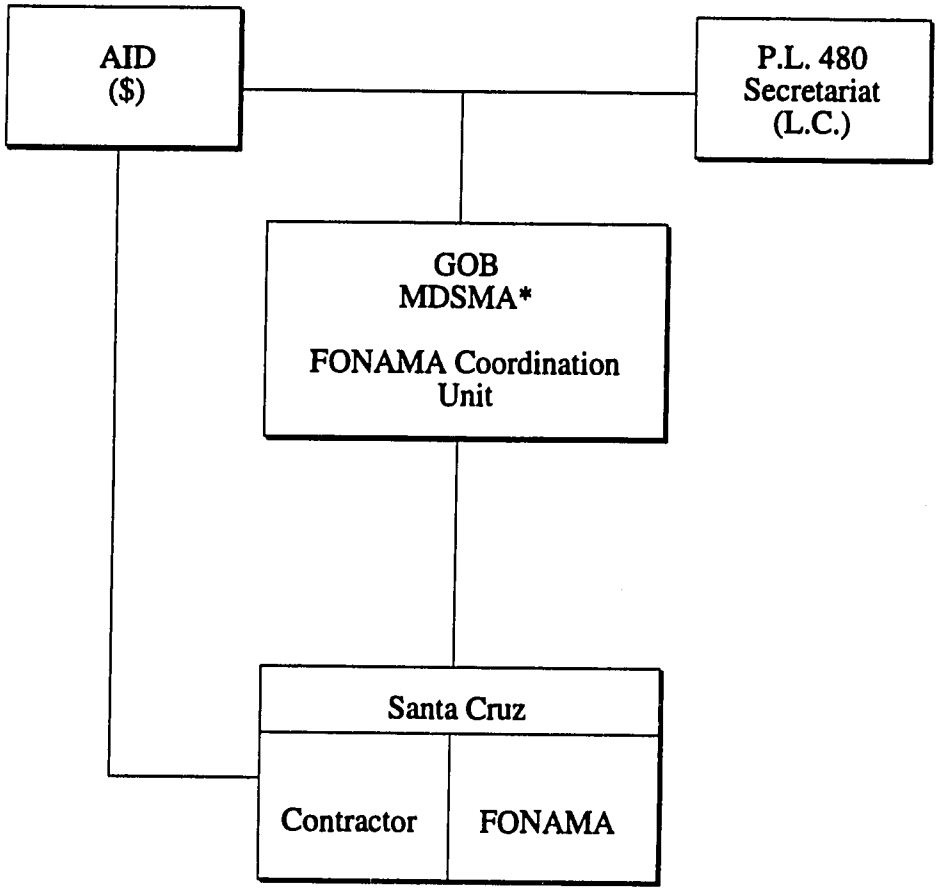
It is anticipated that as the role of the CDF is reviewed and perhaps changed by the new government, CDF Santa Cruz or its successor will participate with other technical staff members in all appropriate BOLFOR activities needed to strengthen their technical capacity to carry out forestry research and extension activities.

c. Collaborating Institutions

Carrying out project activities will also require work with a flexible and changing number of collaborating institutions. These will vary from those that collaborate voluntarily in a BOLFOR activity because of their interest, to those that are contracted to carry out a specific task, such as a survey or the publication of research results. Which institutions BOLFOR will work with, for how long, and with what resources will be defined by the technical assistance team with guidance from the BOLFOR administrative committee as project implementation begins, and will also be reflected in BOLFOR's annual workplans. The following is an illustrative list of potential collaborating institutions: Camara Nacional Forestal, indigenous peoples organizations such as CICOL, NGOs such as APCOB and FAN, CIMAR, university faculties, and CORDECRUZ.

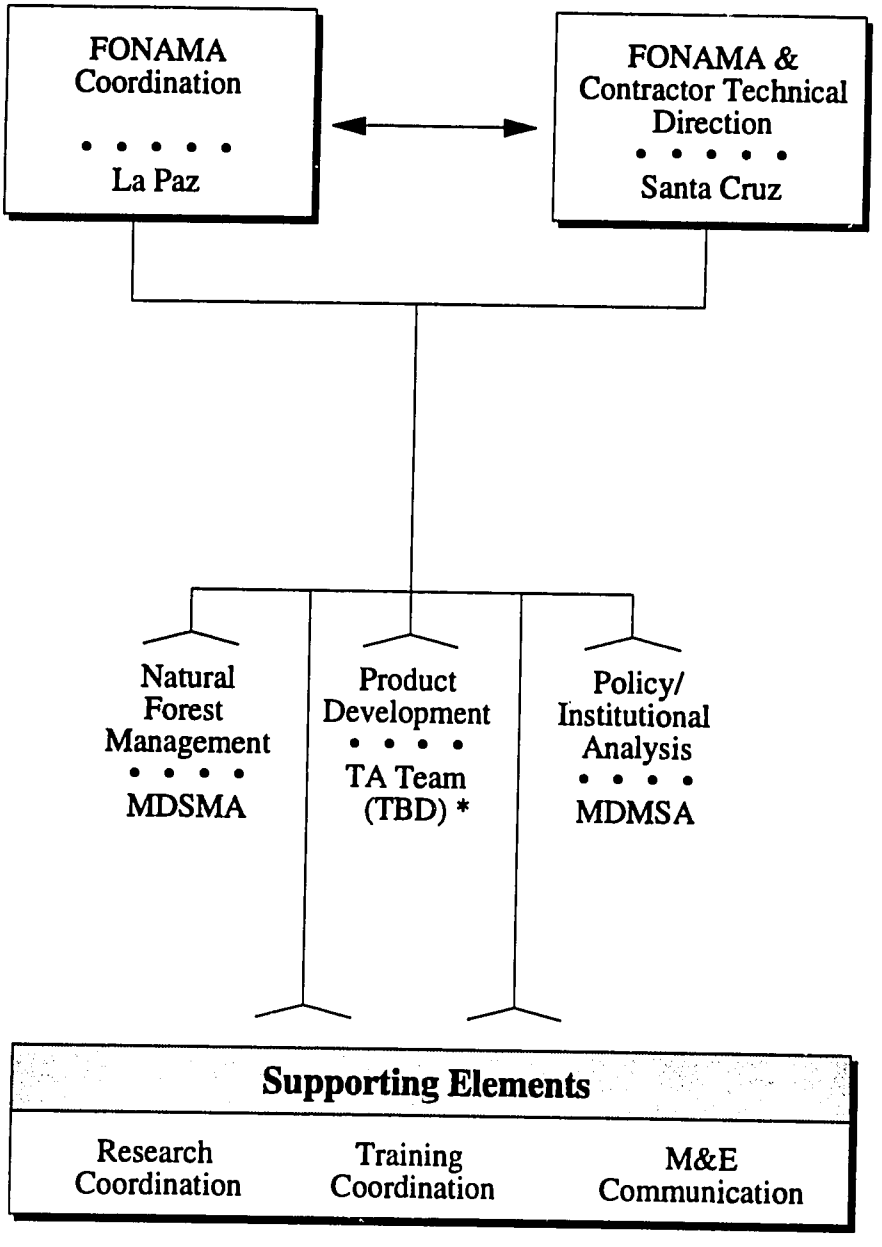
Exhibits III-1,III-2, and III-3, III-4 on the following pages, portray the organizational framework for the project, its staffing, and BOLFOR's funding of staff in counterpart organizations.

Exhibit III-1: BOLFOR Project Organization



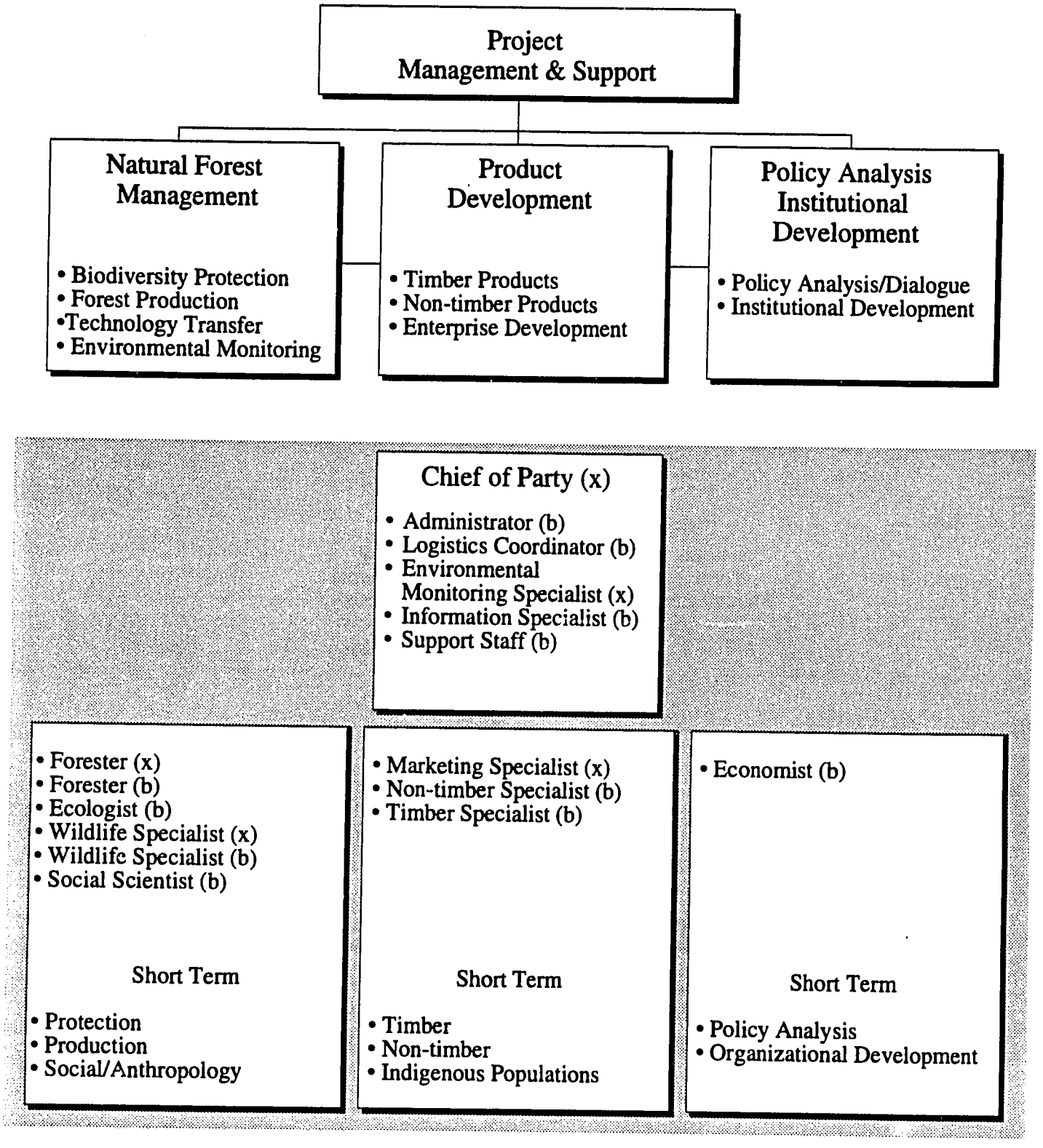
*Ministerio de Desarrollo Sostenible y Medio Ambiente

Exhibit III-2: BOLFOR Project Components and Implementing Agencies



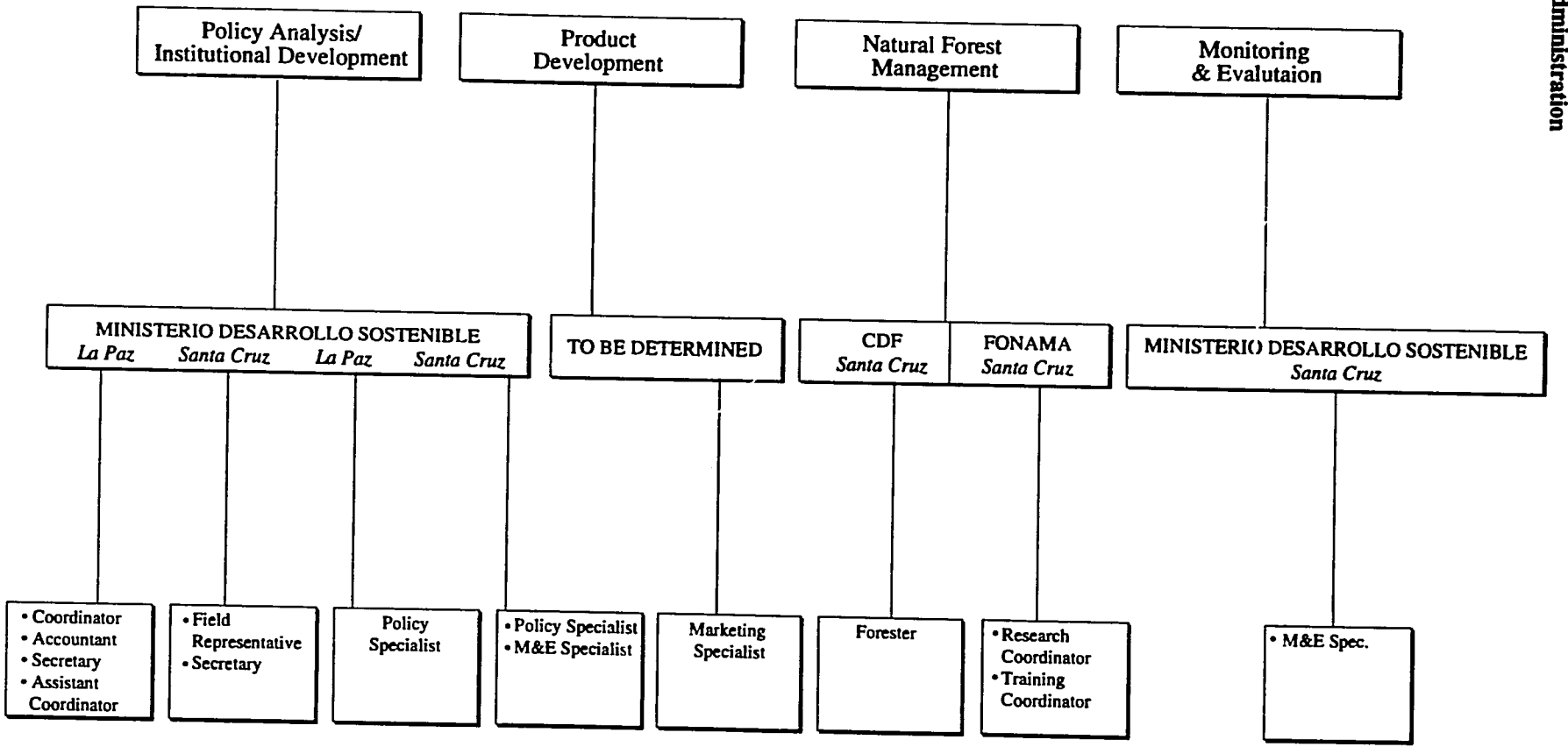
* Implementing agency to be determined (TBD)

Exhibit III-3: BOLFOR Project Components and TA Staffing by Component



NOTE: x = Expatriate Advisor
b = Bolivian Advisor

Exhibit III-4: BOLFOR Funding of Staff in Counterpart Organizations and Their Location



B. PROJECT FOCUS, ACTIVITIES AND PHASING

1. Project Focus: Eco-certification

To the extent possible the BOLFOR project will use market forces to motivate change to less destructive timber and non-timber forest product harvesting practices. One already significant and growing market force springs from worldwide concern for the continued existence of natural forests, the biological diversity they contain, and the continued supply of forest products. This concern is being manifested in an increasing number of tropical timber boycotts and in the emerging "green" consumerism. The threat that their forest products will not have access to high-income markets in environmentally concerned parts of the world is one reason for the widespread interest of Bolivian forest product exporters in "eco-certification." In addition, certified tropical hardwoods now reap an important premium in growing "green" markets. Pronouncements by the Bolivian government that all timber will be harvested in a sustainable manner by 1995 (Pausa Ecológica) and the International Tropical Timber Organization's similar worldwide target for the year 2000 are contributing to the interest in eco-certification of Bolivian forest products. Finally, many members of the Cámara Nacional Forestal and other forest managers already see eco-certification as both a necessary and an attainable goal.

Eco-certification also serves as the focus or central organizational theme for the BOLFOR project insofar as it incorporates forest protection, sustainable forest use, monitoring of the effects of forest management, and marketing of forest products. Eco-certification programs are still developing, but there is general consensus about the basic principles and criteria for forest management. Attainment of this consensus is in part due to the activities of the Forest Stewardship Council, an organization dedicated to monitoring and accrediting forestry certification programs worldwide. The principles of forest management endorsed and promoted by the Council and the eco-certification organizations that it represents are as follows:

Principle 1. Management Plan: A written management plan must exist which clearly states management objectives for each forest, the means for achieving these objectives, and provides for responses to changing ecological, social and economic circumstances.

Principle 2. Forest Security: The ownership of the forest must be clearly defined and documented, and management areas dedicated by the owners to permanent forest cover.

Principle 3. Social and Economic Benefits: Participating parties should receive an equitable share of the benefits arising from forest production activities.

Principle 4. Local Rights: The legal and/or customary rights of indigenous peoples and other long-settled forest-dependent communities affected by forestry activities must be

protected, and forest management planning and implementation must provide for full and informed consent in relation to activities that affect them.

Principle 5. Environmental Impact: Forest management activities must have minimal adverse environmental impact in terms of wildlife, biodiversity, water resources, soils, and non-timber and timber resources.

Principle 6. Sustained Yield: Harvesting rates of forest products must be sustainable in the long-term future.

Principle 7. Maximizing the Forest's Economic Potential: Forest management should take into account the full range of forest products (timber and non-timber), and forest functions and services, and should maximize local value-added processing.

Principle 8. True Costs: The cost of forest products should reflect the full and true costs of forest management and production.

Principle 9. Appropriate Consumption: Forest production should encourage judicious and efficient use of forest products and timber species.

Principle 10. Tree Plantations: Plantations should not replace natural forest; they should explicitly augment, complement, and reduce pressures on existing natural forests.

Principle 11. Chain of Custody: The original sources and subsequent steps in the processing and supply chain must be documented to allow accurate product tracing.

There is concordance between these certification principles and the central theme of the BOLFOR project. The more detailed criteria and compliance guidelines of the certifying groups (e.g., Rainforest Alliance, or Green Cross Certification Program) will influence project-related forest management activities. BOLFOR-sponsored researchers and foresters will work with representatives of the Bolivian forest products industry and an independent internationally recognized eco-certification group (assisted by the project) to develop management guidelines appropriate for Bolivian forests. Working towards the goal of eco-certification also provides an independent evaluation of project performance and will financially benefit those companies, indigenous organizations, and other forest holders who satisfy the stated criteria and become eco-certified.

While there are a number of fairly substantial changes in forest-use practices that need to be made before eco-certification is a possibility, Bolivian forest managers are actually closer to this goal than their colleagues in many other countries. **One major problem that BOLFOR will help to resolve is the present lack of a scientific and economic basis for applying improved forest management techniques and technologies to Bolivian forests.**

2. Project Activities

BOLFOR aims to have 25 percent of all hectares in forest production in Santa Cruz certified as being managed in a sustainable manner. The project will conduct research on the ecological, silvicultural, wildlife and sociocultural factors widely recognized as necessary to establish and apply standards for certification that Bolivia's forests are being managed sustainably and therefore that biodiversity is being protected. It will build human capacity to design and implement programs for sustainable, certified forest use by training professionals, students and forest technicians; test alternative forest management techniques to generate maximum incomes under certified forestry; advise on forest management plans; disseminate research and applied forestry management techniques to expand the area under certified management; conduct economic and policy studies which should lead to an improved regulatory and investment environment for sustainable forest use as well as to improved enforcement of laws governing logging; and assist in commercialization of new products and establishment of new markets so that the economic value of forest is increased and maintained far into the future; in this way the forest (and the biological diversity it contains) will be better protected and conserved.

The project activities have been grouped under three components. In each component, activities are directly linked to meeting the requirements for eco-certification in the form of specific guidelines for forest management, the development of human resources to carry out the work necessary for certification, the generation of information to inform policy, and the provision of technical assistance to enterprises to market their certified products. The following is a brief summary of each component and how it relates to the central theme of the project.

1. **The Natural Forest Management Component** is designed to produce the ecological, economic, technical, and social information needed to define and put into practice sustainable forestry management plans. The activities in this component will: 1) establish what forest products can be harvested sustainably; 2) explore means to increase forest product yields within the limits imposed by the need to conserve biodiversity; 3) define forest-type and site-specific detailed certification requirements; and 4) test and transfer sustainable forest management technologies. In relation to the Forest Stewardship Council's principles of forest management for eco-certification (see above), the activities in this component will provide the information needed to meet principles 5,6,7,9,10 and provide substantial inputs to meet certification requirements 1,3, 4, 8, and 11 as listed above.

2. **The Policy and Institutional Development Component** is designed to produce the information needed to create a favorable policy environment for the adoption of sustainable forestry management plans by the industry and to strengthen key public sector institutions in their ability to enforce policies. The

activities in this component will: 1) study the economics of forest production and management; 2) address forest policy issues; and 3) strengthen key GOB institutions at the local level in their ability to formulate and enforce policies. The activities in this component will produce the input needed to meet forest certification principles 2, 3, 4, 8, 9, and 11, and substantial inputs to meet principles 1, 7 and 10.

3. **The Product Development Component** is designed to help private entrepreneurs become profitable suppliers of timber and non-timber products to the growing international market for sustainable forest products. The activities in this component will: 1) assist forest industry entrepreneurs to learn and apply the technologies needed to manage forests sustainably, meeting all certification requirements; and 2) help them identify and access the most advantageous markets for forest products from sustainably managed forests. These activities will help meet forest certification principles 3, 7, and 11.

The activities that will determine the ecological sustainability and the economic viability of forest production and management are **core** activities and they will take place in phases I and II of the project (see phasing below). Determination of the ecological sustainability of a product will define the activities that follow, such as transferring production technologies, assisting entrepreneurs to meet accompanying certification requirements, and accessing markets. These activities can be considered **conditional** and are included in phase III of the project.

3. Project Phasing

BOLFOR activities will be implemented in three phases over a period of seven years. Since establishing the sustainability of forest production is at the core of the project, for each specific forest product studied or developed the sequence and timing of activities will be dictated first by what needs to be done to establish ecological soundness and economic viability, and second, by what needs to be done to communicate these findings to policy makers and private entrepreneurs engaged in forest production. Parallel to establishing the sustainability of forest management and production, BOLFOR will generate knowledge to inform policy and the expected formulation of new forestry law.

The phasing-in of activities is dictated by the logic of establishing sustainability of forest production and by the best use of the resources available to do so. This includes the staggered arrival of technical assistance team members during the first years of the project and the gradual build up of project activities over the first five years of the project.

BOLFOR activities will start with the arrival of the Chief-of-Party who, together with his/her GOB counterpart (and in consultation with AID and PL-480), will proceed to establish the office and hire local support personnel; establish working relations with key

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implementing counterpart agencies; become familiar with the potential collaborating organizations; visit potential sites; and develop, along with the GOB agencies (and in consultation with AID and PL-480), the legal framework for long-term rights over the research/demonstration parcels in the two permanent test sites. The COP will be followed by the forester and the wildlife specialist, who together with their counterparts and short-term specialists in ecology, anthropology, and economics will proceed to develop the life-of-project work plan, the first annual work plan, and the detailed technical plans for setting up the permanent test sites and the initiation of activities. The detailed anticipated phasing-in of activities can be found in section VIII: Management and Implementation Plan (below). What follows below is a brief descriptive summary of the anticipated phased-in of project activities.

Phase I (Years 1 and 2): Laying the Foundations for Certification.

Project implementation will begin by September of 1993. As noted above, the first semester will be spent setting up offices, establishing working relations with counterparts, and formulating life of project and first annual work plan, as well as the work plans of individual members of the technical assistance team. Following this project start-up period, the following activities will take place.

Natural Forest Management. Data gathering in support of hypothesis testing for priority topics will begin during the first two to four months and continue into the second year. Examples include:

- Measurement of the impact on plant and animal diversity and ecosystem structure of existing palmito, babassu and timber harvesting in the Bajo Paragua and Lomerio.

- Baseline data gathered on flora, fauna, and key ecosystem parameters (this will build on work underway by WCS and other institutions).

- Sites for field testing of forest management strategies for timber and non-timber products will be identified. Data on plant, animal and system impacts will be gathered to compare with control parcels (i.e. no harvest parcels).

- One or two non-timber forest products with established market potential will be identified for research into their regeneration and the impact of their removal on the rest of the ecosystem.

Policy and Institutional Development. Economic analyses will be initiated, and workshops held to debate a new forestry law and/or regulations. Institutional

assessments of counterpart organizations (GOB and others) in Santa Cruz will be carried out, in order to optimize their contributions to BOLFOR's success.

Product Development. The activities in phase I will be limited to formulating a plan to meet certification requirements, and assessing the market potential for eco-certified timber of the three species currently being exported and one or two high priority non-timber products.

Training. Much of the initial research and training will focus on research methodology and the protection side of the project, to assure appropriate problem identification prior to investment in forest management demonstrations. After 18 months research should be well underway leading to demonstration site programs and training modules. After six months the first contingent of Masters degree candidates will have been awarded fellowships for study abroad. These first BOLFOR Fellows will return in 12 to 18 months to begin thesis research on problems identified by the project.

Phase II (Years 3 and 4): Implementing Certification.

The most dramatic addition to project activities during Phase II will be the launching of demonstration and training activities, in order to expand commercial use of sustainable forestry practices.

Natural Forest Management. Research begun during Phase I will continue as needs for certification-relevant information are identified. Ecological, economic and social feasibility studies for various extractive activities will be carried out. Because biological processes in a forest ecosystem are complex and take time, much of the research will continue throughout the project and hopefully beyond; of course, BOLFOR will provide the human resource improvements necessary for that purpose. Examples include growth and yield measures; succession following silvicultural treatments; changes in faunal composition; and species regeneration studies. These activities will become part of the overall Monitoring and Evaluation program, and will inform preparation of training materials.

Policy and Institutional Development. The forest policy and economic analyses will continue, as will the workshops to debate eco-certification and the new forestry law. During this phase, work will focus on developing recommendations on policies, rules, regulations, enforcement mechanisms and pricing incentives. A draft forestry law will be prepared and presented to the GOB by the MDSMA. The capacity of Bolivian institutions to carry out this research and to put in place an effective, independent certification mechanism will be enhanced by the return flow of trained professionals from graduate studies abroad.

Product Development. Work in this component will focus on product development to meet eco-certification requirements, and on the establishment of an independent institution/mechanism for eco-certification.

Training. As per the terms of the EA, supplementary Environmental Assessments will be performed on demonstration and commercially-related training activities. Early activities will emphasize discrete themes (directional felling, extraction, etc.) certain to contribute to lower impact logging. However, by the middle of Phase II it is anticipated that commercial scale demonstrations of logging and non-timber forest product extraction with cooperating forest managers will be well underway.

Phase III (year 5 to End of Project): Broad Dissemination and Expanded Opportunities.

By the beginning of Phase III, the knowledge for eco-certification specific to Bolivian forests should be in place, as well as the internationally recognized, independent mechanism or institution to do so. The Pausa Ecológica and European Community deadlines for certification of the sustainability of forest product harvesting will have passed. A broad spectrum of the forest products industry should be ready to accept and apply sustainable management techniques. Targets for eco-certified timber and non-timber sales will have been met.

Natural Forest Management. Much of the research will refine knowledge about sustainable management, with continued monitoring of activities.

Policy and Institutional Development. The main focus here will be technical assistance in enactment of the new forestry law.

Product Development. Dissemination of sustainable forestry management practices to additional concessionaires and demonstration sites will be heavily emphasized in this phase, along with assistance to forest entrepreneurs to help them meet eco-certification requirements and access and/or consolidate their market share in "green" markets.

Training and Demonstration. Wide dissemination and replication of sustainable forest management will be the primary objective of Phase III. Achievement of success will depend on major participation of Bolivians in the process.

C. NATURAL FOREST MANAGEMENT COMPONENT

1. Overview

Development of ecologically-sound and economically-viable approaches to forest management in Bolivia depends on the availability of data derived from well designed silvicultural, ecological, and socioeconomic research. This project component is designed to generate, in conjunction with other project activities, the information needed to develop

ecologically-sound and economically-viable approaches to forest use, as required for eco-certification.

Capturing much of the essence of the BOLFOR project, the sustainable forest management component will address biodiversity protection, forest production, and training and technology transfer, all as related to the certifiable production of timber and non-timber forest products. All three programs are closely related and include research, environmental monitoring and training activities.

The component's research activities are designed to produce the information needed to define and implement sustainable forestry management plans. To do this the project will analyze the forest ecology of important species, and examine forest management approaches and their impact on biodiversity and on the social and economic life of local populations.

The component's training and technology transfer activities will develop a cadre of professionals and technical staff capable of dealing with a broad range of sustainable forestry management and related certification issues. It will alert and inform opinion makers on the major tropical forest conservation issues, preparing them to make full use of the policy, ecological, institutional, and silvicultural research and analyses which BOLFOR produces. It will train forest managers and workers in desirable, low-impact techniques for performing the work of forestry. The primary and long-lasting result of the BOLFOR project should be enhanced human capacity to protect and manage Bolivia's forests.

The activities of this component will be based on collaboration with commercial and community forestry concessionaires in the Santa Cruz Department. The Moira concession of the Bajo Paraguá and the Chiquitano Community Concession in Lomerio were used for planning purposes because of the characteristics of the sites and the interest expressed by their owners/inhabitants. A final selection will be dependent on reaching agreement on a specific set of activities to be undertaken with project resources in each location in return for support to be provided by the owners/inhabitants. Also, the selection will depend on GOB-guaranteed access to the site for the life of project. Should these precise locations not be accessible or the owners/inhabitants not agree to support the project activities, other locations will be selected.

Shockingly little is known about the forest resources of Bolivia. The regeneration requirements of the major commercial forest products are not known, data are not available on stocking, timber and non-timber product processing need great improvement, and marketing systems require substantial expansion. With so much to be learned BOLFOR's research topics need to be carefully selected for major and immediate impact within the time and resource constraints of the project.

The initial focus of BOLFOR's research efforts will be on the regeneration requirements of Amburana (roble), Cedrela (cedro), Swietenia (mahogany) and Euterpe

(assai). The first three species are the most important commercial timber species and account for almost all the value of Bolivia's wood exports, while assai (for hearts of palm) is among the non-timber forest products most likely to be increasingly exploited in the immediate future. Depending on the degree of success with these products, other commercial timber and non-timber species will be added to the research list at the end of Phase II or beginning of Phase III.

The foundation for much of the forest management research and training to be conducted will be permanent research and demonstration plots in which the establishment, growth, and commercial product yield of selected species can be monitored. Obviously some tasks, such as wildlife monitoring, will require much larger research sites than just the one hectare silvicultural/biological research/demonstration plots. This will most likely include the entire concession and areas surrounding it, especially when these include population settlements. Methods which prove effective on these sites will later be extended to other areas and/or promoted for commercial application with field demonstration.

2. Objectives

This natural forest management component will define the methodology and develop and promote sustainable and commercially viable forest management. The component's objectives include the following:

- To sponsor and conduct research which will generate the information needed for rational forest use, forest products certification, and the preservation of biodiversity required for such certification.

- To develop and test natural forest management methods, and incorporate them into comprehensive model forest management plans that meet green certification requirements.

- To develop the capability of Bolivians responsible for the protection and sustainable use of Bolivian forests, and to use this capability in managing and regulating the use of Bolivian forests.

- To extract from research, and to use targeted training and publicity to promote policy and program decisions that are conducive to long-term investment in sustainable forest management, and otherwise to foster the sustainable utilization of tropical resources.

- To assure the scientific evaluation of ecological and forestry interventions, including monitoring the environmental impact of project interventions and selected logging and ancillary practices, as required for forest product certification.

3. Outputs

The outputs listed below are those that represent the successful culmination of various activities in this component, but with important support from the other two components.

Sustainable Forest Management Practices

- New forestry practices developed and tested in at least 4 different ecological settings, with their economic and ecological performance compared to existing commercial practices (2 by 1995, 2 by 1997).

- Two comprehensive project sites established and functioning (one by 1994, one by 1996).

- Four or more plans for sustainable forest use (including production of timber and/or non-timber forest products) developed, approved and being implemented (2 by 1996, 2 by 1998).

- 25 percent of all hectares in forest production in Santa Cruz (including area in 4 sustainable products above) certified as sustainable by mechanism outlined in C.2 (by 1999). This assumes that certification of forest products will become a significant factor in world markets, and that GOB legislation requiring sustainable forest management is in place and being enforced by 1996.

- At least 4 concessionaires and/or community groups using BOLFOR project recommendations (by 1999).

Research

- At least 8 articles published in professional journals, with at least 4 of these authored or coauthored by Bolivian scientists (2 by 1995, 4 by 1998 and 2 by 1999).

- State of the art manual on sustainable forest management techniques prepared and disseminated, in both Spanish and English (by 1997).

- Companion state of the art manual on techniques for assessing impacts of forest products harvesting on biological diversity (flora and fauna) prepared and disseminated, in both Spanish and English. (by 1997; Note both 2 and 3 can be combined in one manual).

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Training (Human Resource Development)

- Through long-term and other training, a professional cadre of at least 10 Bolivians (MS or PhD levels) capable of designing and implementing plans for sustainable forestry management (including knowing how to comply with all requirements for product certification), are available to the local forest industry, the GOB, Bolivian universities, and the new certification entity (5 by 1997 and 5 by 1999).

- At least one BOLFOR-sponsored international conference held in Bolivia on natural forest management, with BOLFOR staff making at least three keynote presentations, and with other AID assisted countries invited to participate (1997).

- At least 100 persons trained (BS, associate or field personnel level) in specific aspects of sustainable forest management, including low-impact methods of forest product harvesting, techniques for inventories of biological diversity and other relevant topics, in in-country seminars (25 by 1995, 50 by 1997 and 25 by 1999).

4. Management Plan

The staff for this component includes long-term U.S. and Bolivian advisors (total 339 person months), supporting short-term technical specialists (72 person-months), and their counterparts (156 person-months). The overall management of the component will be the responsibility of the senior forester (or forest ecologist) who reports directly to the COP. Much of the work will be undertaken on a task force basis among the long-term advisors and counterparts. These task forces, headed by one of the advisors, will be responsible for all activities and outputs contemplated in the tasks assigned to them. Given the cross-cutting nature of much of the work to be done under this component, a flexible and dynamic approach to managing human and financial resources will produce the best results.

The training programs will be coordinated by the research and training coordinator, located in the project management unit. The coordinator will assist the various technical specialists with the planning and organization of training activities, but the long and short term specialists will be responsible for developing the course content and materials.

D. POLICY AND INSTITUTIONAL ANALYSIS AND DEVELOPMENT COMPONENT

1. Overview

This component focuses on policy analysis and dialogue and on the project's institutional strengthening requirements. These topics are very important to the overall purpose of improving Bolivia's capacity to manage its forest resources; thus the activities will be initiated during the first year and continue throughout the entire project. In conjunction with other project activities, economic analyses planned for the BOLFOR project are intended to: a) inform current debate over natural resource management in Bolivia, and by extension, other countries in the neotropics, and b) provide information that can serve as the basis for changes in government policies and regulations (and therefore, to some extent, in private sector investments) that will promote more sustainable and efficient management of Bolivia's lowland tropical forests.

The project's biological and silvicultural components will provide detailed information concerning what constitutes sustainable management in terms of harvest methods and levels for target species and the impacts of these harvests on biological diversity. This component's economic studies will provide information concerning the costs and returns of sustainable management and how they compare to the costs and returns from current management. This information will be essential if private and public decision makers are to make informed decisions about how forest management can be made more compatible with the goals of conserving biodiversity and promoting long-term economic growth.

Along with information on the types of activities and investments needed to achieve sustainability and efficiency objectives, basic information on costs and returns will allow managers to determine which activities yield the largest benefits per dollar of investment. This, in turn, will permit private operators to distinguish between practices that are worth adopting and those that are not. It will allow project staff to prioritize efforts to encourage loggers to adopt new methods, and government officials to determine what type of government oversight is needed, how much it will cost, whether changes in pricing policies will allow them to finance management changes, and how changes in prices and other policies will affect profits and, consequently, the behavior of private producers. Finally, information concerning the costs and returns from species that are currently marketed and those with market potential will allow both the public and private sectors to anticipate the economic and environmental costs of failing to adopt management reforms to prevent mahogany and other valuable species from being driven to commercial extinction.

This component will be directed by the chief of party and his GOB counterpart. The primary counterpart agency will be the MDSMA, although other organizations will participate in and benefit from the training and advice from the contract team.

The major elements of this component are:

Policy analysis and dialogue. Studies of the various economic and ecological factors leading to current timber and non-timber extraction, processing and sales activities; recommendations of changes that will lead to financially viable, sustainable practices; and seminars and conferences on the policies and regulations themselves, leading to a new forestry law.

Institutional analysis and development. Assistance will be provided to the MSDE as it expands the range of its BOLFOR-related activities to the Santa Cruz department. Assistance will also be provided to the CDF (or its replacement) in Santa Cruz to improve the capacity of mid-level forest technicians to review and advise on the preparation of forest management plans. The specialists in this component will provide advice on the structuring of the product certification mechanism and the eventual establishment of a body responsible for it.

2. Objectives

The primary objectives include:

- Building institutional and professional capacity to formulate and implement economically sustainable forestry programs.
- Developing an economically and ecologically sound analytical basis from which to make recommendations and revise, as appropriate, the laws, policies, rules and regulations governing Bolivia's forestry resources.

Illustrative examples of the kinds of studies that will be required under this component include assessments of:

Logging profitability, in order to determine the extent to which GOB royalties can be raised without jeopardizing the financial viability of logging.

Costs and returns of private sector management activities, to prioritize project investments in promoting different private sector management activities by identifying those with the highest marginal returns.

Opportunity costs of sustainable management, to quantify the costs and benefits of altering management activities to comply with forestry certification standards.

Viability of value-added processing, to assess the financial viability and national and regional comparative advantage of selected investments in value-added wood processing.

Model management plans, to develop model forest management plans for Bajo Paraguá, and, eventually, for Alto Madidi and Bosque Chimanes. The theory, development and use of the plans will be a major focus of workshops and training activities throughout the project.

Another project target that will be addressed with this component is institutional strengthening, in order to support the sustainability of BOLFOR's accomplishments. However, because BOLFOR's resources are limited and the needs for institutional development great, such technical assistance will be provided **only** to those organizations considered <u>essential</u> for the successful attainment of the project objectives. These are:

- **Sustainable forestry certification mechanism.** The first task in this area should be to assist the private and public sectors in the development of an internationally recognized, independent institution or organization capable of certifying sustainable forestry management.

- **MDSMA.** As the MDSMA increases its staff for this project and expands its activities in the policy and M&E areas in Santa Cruz, targeted assistance will be provided.

- **CDF (or its replacement).** CDF's current responsibilities as well as its potential new role should a new forest law be passed, require a capacity to prepare and oversee natural forest management plans. Thus, mid-level technicians will have to be trained. Assistance to CDF will be limited only to the office in Santa Cruz.

3. Outputs

Forestry Law

- At least two public seminars held to discuss a new forestry law, bringing together representatives of both public and private sectors (both completed by September 1995).

- At least three state-of-the-art background papers prepared to inform development of the new forestry legislation, e.g. economics, policy, institutional aspects of sustainable forest management (one in 1994, one in 1995 and one in the first half of 1996).

- Draft forest law and/or regulations presented to the MDSMA by 1996.

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Sustainable Forestry Certification

- Internationally recognized certification mechanism in place able to service both project-assisted and other forest producer groups (1996).

- Four or more project-assisted forest products (timber or non-timber) certified through this mechanism (2 in 1997, 2 in 1998).

Strengthened Institutions

- CDFs (or their replacements) in areas of primary project intervention have technical capacity necessary to advise on, review, and disseminate sustainable forest management plans, as per nationally approved standards. Two sustainable forestry management plans reviewed and disseminated by CDF (1998).

- Regional entities responsible for coordinating natural resource management issues in areas of major project intervention have technical capacity necessary to monitor compliance with sustainable forestry management plans and certification guidelines based on nationally approved standards, with 4 forest concessions effectively monitored (e.g. certification of forest products maintained and/or concessions renewed or canceled based on assessments of environmental management) (1998).

This assumes GOB support for these institutions.

Research

- At least 4 technical articles published in professional journals, with at least 2 of these authored or coauthored by Bolivian scientists (2 by 1996, 2 by 1999).

Training

- At least 50 persons trained through in-country seminars in forestry legislation and certification issues (including at least half from the private sector) (25 by 1995, 25 by 1998).

- At least 3 masters degrees received under BOLFOR sponsored research (by 1998).

- At least 2 masters or PhD degrees received through long-term training.

4. Management Plan

This component will consist of one long-term expatriate natural resource economist (51 person months), working in collaboration with two Bolivian counterparts (one in the MDSMA, the other in the CDF, or its replacement). Short-term TA (65 person months) will be used to produce studies and technical papers that will promote more sustainable and efficient management of Bolivia's lowland tropical forests, be used as technical/policy inputs in the drafting of the new forestry law, and help with the establishment of the certification process. General institutional development support will be provided by the various TA team specialists under the general direction of the COP, with assistance by short-term specialists in various institutional development tasks.

E. PRODUCT DEVELOPMENT COMPONENT

1. Overview

This component focuses on the commercialization aspects of timber and non-timber forest products and related enterprise assistance. It will address those activities needed to increase the value and volume of timber and non-timber products harvested from the forest. A major focus will be on "green" marketing; i.e. product sales to environmentally conscious retail or wholesale buyers/consumers, targeting in particular the key export markets (e.g. U.S., Europe and Japan).

The problems and constraints to be addressed are not unique to this sector and include: lack of knowledge of market opportunities and requirements; need for modern processing and quality control techniques; need for sustainable cultivation and harvesting practices; high transportation costs; lack of proper packing and storage techniques; and access to financing for new and expansions of existing enterprises. A related problem is that indigenous peoples and campesinos currently have no or only very limited legal and organizational means to protect and capture revenues derived from products harvested from their forested lands.

This component will focus on:

Timber products. Niche marketing of traditional species from sustainable management systems ("green marketing"), alternative uses of a limited number of selected secondary species and increased value added.

Non-timber products. Expanded markets and increased value from products currently harvested and marketed as well as potential development (in Phase III) of new NTFPs such as medicinals, food additives, cosmetics and building materials.

Enterprise assistance and development. Financial analysis, advice on legal issues and on organizational improvements and commercialization of products, as necessary to meet BOLFOR's targets for certifiable production. Collaboration with private sector partners to expand markets and integrate local producer groups.

This component will be directed by the TA team itself, at least until the team and the MDSMA have identified a suitable GOB institution (e.g. the Camara Nacional Forestal) to assume this role. The TA team will work with and through the Camara Nacional Forestal and, to the extent that such collaboration facilitates achievement of project goals and objectives, with other organizations that could include production-oriented NGOs, community organizations, and individual enterprises. Likewise, the TA team will coordinate with other programs in Bolivia, such as AID's export and investment promotion project with CARANA, the Fundación Bolivia Exporta, and the CORDEP project with DAI.

2. Objectives

The objectives of this component are geared to results in three major areas: the development of certifiable timber and non-timber products, and related enterprise and human resources development. The specific objectives are:

- Develop plans to meet sustainable certification requirements for timber and non-timber forest products.
- Provide technical assistance and technical inputs to the establishment of public/private council for certification/monitoring compliance.
- Conduct research on sustainable forest product development.
- Provide training in sustainable forest product production and marketing.
- Support expansion of existing enterprises and assist in formation of new enterprises, whether private firms or community owned associations or cooperatives, as necessary to meet BOLFOR's targets for certifiable production.
- Initiate an effort to retrieve and preserve indigenous peoples' forest technologies as a mean of identifying new forest products with commercial potential.

BOLFOR will begin by focusing on the three main timber species (mahogany, roble and cedro) both in terms of the research needed to establish their continued harvesting on a sustainable basis and the broader ecological sustainability of this harvest, and the

transformation of these traditional timber products into "new" products through eco-certification. Other species with commercial value such as Cerebo and Morado may be gradually incorporated into BOLFOR research and product development activities, once work in the three main species is well underway and proceeding successfully.

The technical analysis also indicates that strong potential exists for product and market development of non-timber forest products (NTFPs). However, until specific forest sites are more thoroughly inventoried, specific products cannot be selected. The strategy, therefore, will be again to organize activities in phases, based on specific categories of products and criteria, which will lead to analyses and business plans for the various products under consideration:

Category 1. Products currently being sold or further processed for domestic and/or export markets, with known prospects for increased sales and possibly further valued added processing, such as palm hearts. Of course, sustainable cultivation and harvesting practices will have to be tested further by BOLFOR and certified as ecologically sound, prior to any direct or indirect BOLFOR involvement in commercialization of these products.

Category 2. Products with potential market outlets, based on existing data or knowledge of demand requirements, but where specific buyers or sales channels need to be identified and where sustainable cultivation and harvesting practices have to be tested further. An example is the cusi (babassu) palm, whose fruit produces oils (for hair and cosmetics, and as an edible oil) and whose husk produces high-grade activated charcoal (with a market in Bolivia's mining sector).

Category 3. Products where considerably more study has to be undertaken on both markets and sources of raw materials, such as plants for pharmaceutical uses. These products will be dealt with only on a target of opportunity basis in Phase III.

3. Outputs

It is understood that BOLFOR will work with forest products only if they can be sustainably cultivated and harvested. Key outputs are:

Sustainable Forestry Certification

- Four or more project-assisted products (timber or non-timber) certified through this mechanism — 2 in 1995 and 2 in 1996.

Timber Products

- Successful marketing of at least two certifiable forest products and/or two value added products from two species currently being marketed, with total dollar volume of sales at least $2 million by 1998.

- Marketing of two additional certifiable forest products from two additional species, with total dollar volume of sales of at least $.5 million by 1999.

Non-timber Products

- Successful marketing of at least two certifiable forest products and/or two value added products from two species currently being marketed, with total dollar volume of sales at least $.5 million by 1997.

- Marketing of two additional certifiable forest products from two additional species by 1999.

Research

- Research under this component should result in knowledge of the types and techniques of sustainable production and marketing of timber and non-timber products. Written reports and project bulletins will be available to substantiate this research.

Training

- At least 24 persons trained in forest product development in in-country seminars, with at least half the trainees from the private sector (12 by 1997 and 12 by 1999).

4. Management Plan

This component will be directed by the marketing and product development specialist (36 person months) under the technical assistance contract, and supported by other long-term staff (114 person months), selected short term experts (44 person months), and counterpart staff (66 person months). The specialist will be responsible for product screening and selection and will supervise the feasibility analysis from ecological, cultural and economic perspectives. An interdisciplinary approach will be required to ensure that products are not pursued unless they are likely to be viable on all three levels.

Each product will require varied levels of effort from each team member and various amounts of coordination with outside organizations. The team will be responsible for

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networking with all relevant organizations to avoid duplication of effort and to play its primary role as a coordinating "broker."

F. PROJECT SUPPORT ELEMENTS

Each of the project components involves research and training, as well as environmental monitoring and dissemination of information. BOLFOR is unlike other projects in this respect. In fact, much of what BOLFOR will do in sustainable forestry will be done for the first time. Thus, rather than simply transferring known technologies and techniques (some of which will of course be done), BOLFOR will carry out adaptive research needed to develop the sustainable forestry management technologies and standards that will lead to certification in Bolivia.

The specialists in charge of the different sets of activities in each project component will be responsible for planning, designing, and carrying out of all research, training, monitoring and information dissemination activities needed to accomplish project objectives.

The natural forest management component will involve the greatest amount of research, training, monitoring, and dissemination of information. Thus, the various sets of activities in this component will require considerable administrative and logistical support. To meet this need, BOLFOR will have research and training coordinators as counterparts in the project's Santa Cruz office. Also, the TA team will have a logistics coordinator, an environmental monitoring specialist and an information specialist as part of the supporting staff.

A description of the three supporting elements follows:

1. Research Coordination

The role of the research coordinator in the MDSMA is to serve as facilitator for the specialists on the team, and as a contact point between the team and the various counterpart organizations to be involved in each of the project components. The research coordinator will work closely with the TA team in developing what in effect will become a project-wide research and training program. The main tasks will be to facilitate the specialists' research plans and to coordinate all activities within the project and between the project and the MDSMA and CDF (or its replacement) as appropriate. Specific research plans for the year will be developed during the annual project planning sessions.

The research to be undertaken has been discussed in detail under each component and **will include only those activities necessary to lead to sustainable forest management plans, which in turn is a prerequisite for Bolivian forest producers to obtain internationally recognized certification.**

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2. Training Coordination

Coordination of training activities includes a variety of tasks which will be closely linked to those of the research coordinator. The MDSMA training coordinator will be charged with all tasks relating to participant training (with help from the home office of the TA contractor) and short term, third country training. The coordinator also will be charged with coordinating in-country training linkages with the universities and the various other organizations to be involved (including other donor activities, such as those planned by the World Wildlife Fund), such as the CDF (or its replacement), the CNF, and forest workers.

Training will include short courses, workshops or seminars for GOB decision makers; technical short courses for forest managers and researchers on emerging forestry issues, including related gender analysis and participatory research; and practical short courses for forest workers. This will include on the job teaching on topics such as reduced impact log removal for skidder operators, directional felling for loggers, road drainage for bulldozer drivers, and efficient sawmill operations for sawyers.

In addition, a selected group of about 12 Bolivians will be sent abroad to acquire MA, MS, or Ph.D. degrees from various universities in the U.S. or third countries, in BOLFOR-related areas of specialization. The TA team is responsible for advising on the selection of the candidates and the management of the program.

A semester diploma course in forest resource management ecology and conservation biology will also be offered in Santa Cruz (taught by BOLFOR project staff, in collaboration with staff of the Ecology Institute in La Paz). This course is intended to equip researchers with the knowledge and intellectual orientation needed to conduct ecological research in tropical forest ecology and conservation management. The course is likely to be undertaken in collaboration with the Ecology Institute of La Paz. A subsequent field course in ecological, silvicultural and socioeconomic methods will provide the practical knowledge needed to conduct research in the field.

3. Monitoring, Evaluation, Communications and Dissemination

This support activity will provide technical input to the monitoring and evaluation, information, and dissemination needs of the three project components (project progress monitoring is dealt with in section IX). Much of what BOLFOR has been designed to accomplish is of great interest not only to Bolivia, but also to the international community interested in the protection of tropical forests. Consequently information collection and dissemination should be an important activity, and will include establishment of research-in-progress databases. This will be directed from the project management unit and will serve the various information needs of the TA team, project management, and a heterogeneous national and international audience of people and institutions interested in the results of

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BOLFOR's work. The expatriate and Bolivian monitoring, evaluation and information specialists, along with the MDSMA's M&E and communications specialists, will provide the necessary support to these activities.

Program outreach and communications will provide audio-visual aids and editing support, and publish and distribute a quarterly BOLFOR newsletter. It will support BOLFOR's linkage with other national and international organizations in the interchange of information. Outreach activities will be aimed primarily at the national and international forest industry and markets, and at the conservation community.

In addition, research results will be reviewed, edited, and submitted for publication in refereed journals. Project staff, grantees, and contract researchers will also draft popular articles and guide the development of videos for distribution among targeted groups in the country.

G. PARTICIPANTS

This project design was highly participatory. Besides the GOB Project Working Group, which followed all steps of the design process and contributed directly to it, a wide variety of public and private Bolivian institutions were regularly consulted by members of the design team. The most important participants in implementation are expected to be the following:

Institutions with Specific Roles

- MDSMA (Ministerio de Desarrollo Sostenible y Medio Ambiente), lead GOB entity for BOLFOR;
- FONAMA (Fondo Nacional para el Medio Ambiente, under the MDSMA);
- CDF-Santa Cruz or its replacement (Centro de Desarrollo Forestal en el Departamento de Santa Cruz).

Other institutions that BOLFOR could collaborate with, to the extent that such collaboration would further achievement of BOLFOR goals and objectives, could include:

- CORDECRUZ (Corporación de Desarrollo del Departamento de Santa Cruz)
- CNF (Cámara Nacional Forestal)
- FAN (Fundación Amigos de la Naturaleza)
- APCOB (Apoyo para el Campesino Indígena del Oriente Boliviano)
- Forest concessionaire(s) (to be determined)
- CICOL Lomerio Forestry Project
- Universities
- FBX (Fundación Bolivia Exporta)
- Carana Corporation (through the export promotion project)

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- DAI (through the CORDEP project)

H. BENEFICIARIES

Successful implementation of this project will bring broad benefits to a wide variety of beneficiaries, both directly through participation, and indirectly, through reduced degradation of forest, soil, water and biological resources in the lowlands. BOLFOR beneficiaries include institutions and individuals. Two categories of individuals will benefit directly from project activities. These are the professionals needed to design and implement sustainable forestry projects, and the populations who depend on forest resources for their well-being and who derive part or all of their incomes from forestry activities. In the first case, the project will endeavor to insure adequate representation of women university students in various forestry related specialties (through BOLFOR research and training programs), so that they, too, may find training and employment in fields traditionally occupied by males (e.g.forest engineering) and/or find employment in new fields (e.g. biology, ecology, and botany) needed to design, implement and evaluate sustainable forestry programs. In the second case, understanding and protecting local peoples' access to and rights over forest resources, and insuring that the social and economic benefits of these resources are distributed fairly, are basic certification requirements. Of course, these include understanding relevant gender issues among the diverse social and cultural populations likely found in project sites.

Those who will benefit most directly are the following:

The Bolivian Government and its environmental and forestry entities through building capacity to formulate and implement policies for sustainable use of forest resources

- MDSMA (Ministerio de Desarrollo Sostenible y Medio Ambiente)
- CDF-Santa Cruz, or its replacement (Centro de Desarrollo Forestal del Departamento de Santa Cruz)
- FONAMA (Fondo Nacional para el Medio Ambiente), part of the MDSMA.

Private Sector Enterprises and their Workers

- The forestry industry, to the extent that it adopts sustainable NFM practices, will not only increase profits in the long term, but also help assure a long term supply of hardwood and of NTFPs.

- Forestry workers, technicians, professionals, and decision makers will benefit individually, through tailored, comprehensive training programs.

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- The owners and workers of the Moira concession and the CICOL Lomerio Project are expected to benefit directly from the design and implementation of sustainable forest management plans and training.

Non-Governmental Institutions

- The teaching and research institutions in Bolivia will benefit directly by their participation in the training and research program.

- Santa Cruz NGOs will benefit from working with highly trained foreign technicians and by implementing programs in line with their respective missions.

Rural Communities/Indigenous Peoples

- The project will sponsor activities to work with selected indigenous peoples in the project areas, as appropriate, to further project goals and objectives (e.g. systematic retrieval of indigenous technologies, knowledge of the forest, and forest products).

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SECTION IV
PROCUREMENT PLAN

The project will procure long- and short-term technical assistance, training activities (local and international), research services, and commodities. An AID direct contract with an institutional contractor is anticipated as a continuation of the DAP contract mode initiated for the design phase. Waivers to code 941 for procurement of training in Costa Rica or in Brazil will be needed.

A. AID

USAID/Bolivia will procure a modest amount of non-technical commodities such as vehicles, household furnishings and canoes. Based on specifications provided by the institutional contractor, the AID project manager will prepare a PIO/C for these items and process these through normal direct contracting channels. AID will also directly procure evaluation services and one audit during the life of project.

2. MSDMA/FONAMA

The Ministry for Sustainable Development and the Environment and FONAMA, part of the Ministry, will procure various commodities using local currencies provided by the PL 480 Secretariat and host country contracting procedures under A.I.D Handbook 11. These commodities will be used to support counterpart personnel as well as overall needs of the technical assistance contractor.

In order to ensure that adequate systems and internal controls are in place and functional, the Mission Financial Analysis and Review Section will perform a Pre-Award Survey of the MDSMA and FONAMA's ability to adequately manage and account for these resources and to procure goods and services under Handbook 11. The review will focus on the accounting and information systems, personnel and property management, procurement and travel policies and procedures, internal controls, and cash management.

3. Institutional Contractor

The institutional contractor will be responsible for procurement of the project's technical equipment, long term participant training services and short term courses from U.S. or LAC based universities. The commodity procurement for the project will vary from office furnishings to computer and technical equipment to support research. Procurement of those items that can be obtained locally and in a cost effective way would be procured in Bolivia (with approval by USAID as required). Procurement of computer hardware, software, and more technical equipment (with approval by USAID as required) would be from U.S. manufacturers and distributors through the contractor's procurement systems and under the supervision of its project administration support team. Funds for this procurement will be provided for in the contract.

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SECTION V
FINANCIAL PLAN AND BUDGET

A. Project Budget

The total amount of the seven-year project is $20 million. Of this amount, USAID foreign exchange and PL-480 local currency funds are $15 million and $5 million respectively. Monies will be obligated under two different arrangements: a Project Agreement with the Ministry of Sustainable Development and the Environment (MDSMA, with FONAMA) and a direct contract with an institutional contractor.

B. Summary Budget

The attached summary tables provide budgetary details. Annex D contains the detailed cost spreadsheets and cost notes. AID financing will be incrementally provided, with project obligations of approximately $2.9 million in FY 1993, $3.0 in FY 1994, $3.0 in FY 1995, etc.

C. Funding Flow and Structure

The DA and PL 480 funds are designed to flow through the following channels for the uses specified.

Sources	Channels	Uses
DA (FX)	TA contractor	TA team and related expenses U.S. and 3rd country training Commodity procurement Research stipends Subgrants Workshops/seminars (out of country) Faculty exchanges
USAID/Bolivia		Vehicles and household furnishings Evaluations Audits Project management Small research and dissemination grants
PL 480 (LC)	MDSMA/FONAMA	Counterpart personnel Counterpart operations Counterpart commodities

Subgrants
Local training costs
Workshops and seminars (in-country)

D. Implementation Plan

The project will be implemented in part by a local currency agreement with the MDSMA, using PL 480 funds from the PL 480 secretariat, administered by FONAMA. In addition, an institutional contract will be signed to provide technical services, to manage long and short term training activities and to procure technical commodities needed for the project. This contract is required primarily because the technical skills needed to implement the project's activities are not available in Bolivia.

A Project Grant Agreement (ProAg) will be signed with the GOB in order to obligate the funds for this project. The ProAg will have provisions for USAID/Bolivia to contract directly with Chemonics on behalf of the GOB to provide technical assistance for project implementation.

Financial reporting by the contractor will be done monthly as invoices are prepared and sent to USAID/Bolivia for review, approval and payment. The monthly invoicing will indicate total funding budgeted by major budgetary line item, amount invoiced in a particular month, amount invoiced to date and balance remaining in a given line item. In addition, the contractor will establish a reporting system to track commitments of funds to assure that the contractor does not make commitments unless obligated monies are available.

In this regard, for this project the areas of most concern are procurement of commodities and training. Thus, at the outset of project implementation, specific training and procurement plans will be developed by the contractor and reviewed and approved by AID and the GOB. These plans will include a description of the respective training and procurement activities (or steps) to be undertaken, identify the training programs to be organized and commodities to be procured, the estimated costs, and the projected timing. The plans will be updated and revised as necessary, usually on an annual basis, but perhaps more frequently. Funds will not be expended by the contractor for training or procurement unless they fall within the plans and, of course, monies are available. Reporting against these plans will be done routinely in conjunction with the normal contract reporting. Commitment should be reported on a monthly status report along with costs incurred. More frequent reports will be required as appropriate, for example in times when training or procurement activities are particularly intense.

Methods of implementation and financing to be used in the project are summarized as follows:

METHODS OF IMPLEMENTATION AND FINANCING

Method of Implementation	Method of Financing	Approx. Value (U.S. $000)
Direct Contract with U.S. Consortium which includes procurement.	Bank L/COM	14,025
PL 480 Grant	Direct Reimbursement w/advances	5,000
Direct AID Procurement of Commodities	Direct Payment	250
Direct AID TA contracts e.g. evaluation and audit	Direct Payment	270
Local support costs paid by AID	Direct Payment	315
Training paid by AID	Direct Payment	140
Total Project		20,000

Summary Budget for the Project Paper for the Bolivia Sustainable Forestry Management (BOLFOR) Project		
	FX	LC
1. MDSMA	0	4,955,000
2. CONSORTIUM	13,970,000	0
3. USAID/BOLIVIA	1,030,000	45,000
TOTAL	15,000,000	5,000,000

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Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)
BUDGET SUMMARY BY COMPONENT & CURRENCY REQUIREMENT

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	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
MGT/ADMIN	1,139,230	461,820	1,228,904	344,780	1,033,565	392,720	833,233	385,960	779,385	303,960	728,707	296,260	449,664	357,272	6,192,688	2,542,772
POLICY/INSTITUTIONAL ANALYSIS	170,983	31,520	251,426	66,040	314,409	66,040	283,077	66,040	243,296	58,040	106,165	58,040	18,273	75,078	1,389,629	420,798
NATURAL FOREST MANAGEMENT	664,559	165,200	967,675	328,900	1,105,488	344,400	824,955	324,400	467,587	263,400	249,797	219,900	118,717	154,130	4,398,778	1,800,330
PRODUCT DEVELOPMENT	38,037	30,000	443,224	30,000	530,511	30,000	540,090	30,000	280,155	30,000	173,256	30,000	33,632	11,100	2,038,905	191,100
USAID/BOLIVIA	297,500	12,850	162,500	4,450	108,500	5,350	103,500	4,500	103,000	5,350	102,500	4,650	102,500	7,850	980,000	45,000
TOTAL	2,310,309	701,390	3,053,729	774,170	3,092,473	838,510	2,584,855	810,900	1,873,423	660,750	1,362,425	608,850	722,786	605,430	15,000,000	5,000,000
TOTAL (FX + LC)		3,011,699		3,827,899		3,930,983		3,395,755		2,534,173		1,971,275		1,328,216		20,000,000

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Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)
STAFFING AND OPERATIONAL COSTS SUMMARY TABLE

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COMPONENT	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL FX	TOTAL LC
1. MANAGEMENT / ADMINISTRATION	902,630	418,820	1,146,654	232,040	957,065	262,540	783,233	259,540	749,385	232,540	698,707	225,340	436,164	319,312	5,673,838	1,950,132
Staff	650,278	72,000	791,560	129,600	622,488	129,600	479,856	129,600	455,765	129,600	434,525	129,600	227,912	129,600	3,662,484	649,600
Operations Costs	123,317	33,200	200,530	38,100	199,000	38,600	196,284	38,600	195,866	38,600	168,966	31,400	130,032	21,192	1,213,995	239,692
Travel & Per Diem	74,530	13,820	71,758	14,340	58,702	14,340	32,312	14,340	25,537	14,340	25,412	14,340	23,352	14,340	311,603	99,660
Allowances	54,505	0	36,658	0	38,608	0	36,858	0	36,858	0	36,858	0	35,129	0	275,674	0
Evaluations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Audits	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grants to NGOs	0	50,000	0	50,000	0	50,000	0	50,000	0	50,000	0	50,000	0	45,000	0	345,000
Certification Unit	0	0	0	0	0	30,000	0	27,000	0	0	0	0	0	0	0	57,000
FAN Headquarters Support	0	250,000	0	0	0	0	0	0	0	0	0	0	0	0	0	250,000
Inflation / Contingency	0	0	45,848	0	38,267	0	37,923	0	35,359	0	32,946	0	19,739	109,180	210,082	109,180
2. POLICY/INSTITUTIONAL ANALYSIS	168,483	26,520	223,926	53,040	271,909	53,040	240,577	53,040	215,796	53,040	105,665	53,040	15,773	73,078	1,242,129	364,798
Staff	126,940	24,000	161,764	48,000	206,054	48,000	180,409	48,000	162,997	48,000	87,346	48,000	14,160	48,000	939,670	312,000
Operations Costs	2,993	0	3,742	0	3,642	0	3,368	0	2,993	0	748	0	0	0	17,686	0
Travel & Per Diem	38,550	2,520	48,750	5,040	49,920	5,040	43,320	5,040	38,220	5,040	12,420	5,040	743	5,040	231,923	32,760
Allowances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inflation / Contingency	0	0	9,670	0	12,093	0	13,480	0	11,586	0	5,151	0	870	20,038	52,850	20,038
3. NATURAL FORESTRY MGMT (NFM)	396,479	92,200	684,400	121,900	742,763	121,900	522,955	121,900	281,487	59,400	207,022	59,400	83,092	145,130	2,918,198	721,830
Staff	274,554	25,200	525,020	50,400	584,256	50,400	384,521	50,400	223,150	50,400	171,204	50,400	68,815	50,400	2,231,520	327,600
Operations Costs	8,675	0	18,430	0	17,507	0	4,976	0	1,871	0	1,123	0	374	0	52,956	0
Facilities	0	62,500	0	62,500	0	62,500	0	62,500	0	0	0	0	0	0	0	250,000
Travel & Per Diem	54,457	4,500	69,972	9,000	64,722	9,000	60,157	9,000	34,200	9,000	22,800	9,000	8,250	9,000	314,558	58,500
Allowances	58,793	0	35,110	0	35,110	0	35,718	0	0	0	0	0	0	0	164,731	0
Inflation / Contingency	0	0	35,868	0	41,168	0	37,583	0	22,266	0	11,895	0	5,653	85,730	154,433	85,730
4. PRODUCT DEVELOPMENT	36,037	0	441,224	0	508,511	0	518,090	0	258,155	0	171,256	0	31,632	9,100	1,964,905	9,100
Staff	26,589	0	299,536	0	377,704	0	364,410	0	192,103	0	130,692	0	28,320	0	1,419,354	0
Operations Costs	748	0	26,589	0	25,063	0	25,189	0	21,871	0	20,374	0	0	0	119,834	0
Travel & Per Diem	8,700	0	48,422	0	52,060	0	56,142	0	30,840	0	11,940	0	1,710	0	209,814	0
Allowances	0	0	49,630	0	33,280	0	46,630	0	0	0	0	0	0	0	129,540	0
Inflation / Contingency	0	0	17,047	0	20,404	0	25,719	0	13,341	0	8,250	0	1,602	9,100	86,363	9,100
5. USAID / BOLIVIA	42,500	2,850	137,500	4,450	78,500	5,350	73,500	4,500	78,000	5,350	77,500	4,650	82,500	7,850	570,000	35,000
Evaluations	0	0	25,000	1,600	30,000	2,500	25,000	1,600	30,000	2,500	30,000	1,800	55,000	5,000	195,000	15,000
Audits	0	0	60,000	0	0	0	0	0	0	0	0	0	0	0	60,000	0
Project Support	42,500	2,850	52,500	2,850	48,500	2,850	48,500	2,900	48,000	2,850	47,500	2,850	27,500	2,850	315,000	20,000
TOTAL	1,546,129	540,390	2,633,704	411,430	2,558,748	442,830	2,138,355	438,980	1,582,823	350,330	1,260,150	342,430	649,161	554,470	12,369,070	3,080,660

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

COMMODITY SUMMARY TABLE

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	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. MANAGEMENT/ADMINISTRATION	234,600	27,000	40,250	7,500	34,500	2,500	23,000	2,500	23,000	2,500	23,000	2,000	11,500	0	389,850	44,000
2. POLICY / INSTITUTIONAL ANALYSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. NATURAL FORESTRY MANAGEMENT	136,850	40,000	25,875	28,500	24,725	26,500	23,000	16,000	16,100	15,000	9,775	12,000	8,625	7,000	244,950	145,000
4. PRODUCT DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. USAID / BOLIVIA	230,000	10,000	0	0	0	0	0	0	0	0	0	0	0	0	230,000	10,000
TOTAL	601,450	77,000	66,125	36,000	59,225	29,000	46,000	18,500	39,100	17,500	32,775	14,000	20,125	7,000	864,800	199,000
TOTAL (FX + LC)		678,450		102,125		88,225		64,500		56,600		46,775		27,125		1,063,800

OTHER TECHNICAL EXPENSES

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	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. MANAGEMENT/ADMINISTRATION	0	14,000	0	28,240	0	50,580	0	56,920	0	56,920	0	56,920	0	35,960	0	299,640
2. POLICY / INSTITUTIONAL ANALYSIS	500	0	500	0	500	0	500	0	500	0	500	0	500	0	3,500	0
3. NATURAL FORESTRY MANAGEMENT	1,000	0	3,000	0	3,000	0	3,000	0	2,000	0	2,000	0	0	0	14,000	0
4. PRODUCT DEVELOPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1,500	14,000	3,500	28,240	3,500	50,680	3,500	56,920	2,500	56,920	2,500	56,920	500	35,960	17,500	299,640
TOTAL (FX + LC)		15,500		31,740		54,180		60,420		59,420		59,420		36,460		317,140

COMMODITIES + OTHER TECH. EXPENSES

TOTAL	602,950	91,000	69,625	64,240	62,725	79,680	49,500	75,420	41,600	74,420	35,275	70,920	20,625	42,960	882,300	498,640
TOTAL (FX + LC)		693,950		133,865		142,405		124,920		116,020		106,195		63,585		1,380,940

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)
TRAINING SUMMARY TABLE

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COMPONENT	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. MANAGEMENT/ADMINISTRATION	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
2. POLICY/INSTITUTIONAL	2,000	2,000	27,000	2,000	27,000	2,000	27,000	2,000	27,000	2,000	2,000	2,000	2,000	2,000	114,000	14,000
3. NATURAL FORESTRY MANAGEMENT	2,000	2,000	151,000	51,500	255,000	61,000	201,000	51,500	108,000	54,000	31,000	21,500	27,000	2,000	775,000	243,500
4. PRODUCT DEVELOPMENT	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
5. USAID/BOLIVIA	25,000	0	25,000	0	30,000	0	30,000	0	25,000	0	25,000	0	20,000	0	180,000	0
TOTAL	33,000	8,000	207,000	57,500	316,000	67,000	262,000	57,500	164,000	60,000	62,000	27,500	53,000	8,000	1,097,000	285,500
TOTAL (FX + LC)		41,000		264,500		383,000		319,500		224,000		89,500		61,000		1,382,500

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)
RESEARCH SUMMARY TABLE

23-Aug-93 05:30 PM

	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. MANAGEMENT/ADMINISTRATION	0	0	40,000	75,000	40,000	75,000	25,000	65,000	5,000	10,000	5,000	10,000	0	0	115,000	235,000
2. POLICY / INSTITUTIONAL ANALYSIS	0	3,000	0	11,000	15,000	11,000	15,000	11,000	0	3,000	0	3,000	0	0	30,000	42,000
3. NATURAL FORESTRY MANAGEMENT	128,230	31,000	103,400	127,000	80,000	135,000	75,000	135,000	60,000	135,000	0	127,000	0	0	446,630	690,000
4. PRODUCT DEVELOPEMNT	0	28,000	0	28,000	20,000	28,000	20,000	28,000	20,000	28,000	0	28,000	0	0	60,000	168,000
5. USAID / BOLIVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	128,230	62,000	143,400	241,000	155,000	249,000	135,000	239,000	85,000	176,000	5,000	168,000	0	0	651,630	1,135,000
TOTAL (FX + LC)		190,230		384,400		404,000		374,000		261,000		173,000		0		1,786,630

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR) 07:22 PM

LEVEL OF EFFORT TABLE

23-Aug-93	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	TOTAL LOE	LOE % LT & ST Foreign	LOE % LT & ST Bolivian
1. MANAGEMENT/ADMINISTRATION										
Consortium Home Office Administrative Support										
Project Supervisors (Expatriate)	3.0	3.0	3.0	2.5	1.5	1.5	1.0	15.5		
Project Administrators (Expatriate)	3.5	3.5	3.5	1.5	1.5	1.5	1.0	16.0		
Field Accountant	1.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5		
Logistics	1.0	0.5	0.5	0.5	0.5	0.5	0.5	4.0		
Consortium Home Office Technical Support										
Procurement Specialist	2.0	2.0	0.0	0.0	0.0	0.0	0.0	4.0		
Procurement Agent	2.0	2.0	0.0	0.0	0.0	0.0	0.0	4.0		
Communications Specilaist	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0		
Management Infomation Systems	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0		
Participant Training	4.0	4.0	2.0	0.0	0.0	0.0	0.0	10.0		
								57.0		
Santa Cruz Office/Contractor										
Chief of Party (Expatriate)	12	12	12	12	12	12	6	78	47%	53%
M&E/MIS Specialist (Expatriate)	6	12	6	0	0	0	0	24		
Information Specilist (Local)	3	12	12	12	12	12	6	69		
Logistics Coordinator (Local)	3	12	12	12	9	0	0	48		
								219		
Short-Term										
Expatriate	6	5	2	0	0	0	0	13	100%	0%
Local	0	0	0	0	0	0	0	0		
								13		
TOTAL MGT/ADMIN LOE								**289**		
2. POLICY / INSTITUTIONAL ANALYSIS										
Long-Term										
Economist (Local)	0	0	12	12	12	12	3	51		100%
								51		
Short-Term										
Expatriate	8	10	10	9	8	2	0	47	72%	
Local	5	7	4	1	0	1	0	18		28%
								65		
TOTAL POLICY/INSTITUTIONAL ANALYSIS								**116**		

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR) 07:22 PM

LEVEL OF EFFORT TABLE

23-Aug-93	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	TOTAL LOE	LOE % LT & ST	
3. NATURAL FOREST MANAGEMENT (NFM)										
Long-Term										
Tropical Forester (Expatriate)	9	12	12	3	0	0	0	36	29%	
Wildlife/Biodiversity (Expatriate)	3	12	12	9	0	0	0	36		
Forester (Local)	0	0	12	12	12	12	6	54		71%
Ecologist (Local)	0	0	0	12	12	12	6	42		
Social Scientist (Local)	3	12	12	9	0	0	0	36		
Wildlife Specialist (Local)	0	0	12	12	12	6	0	42		
								246		
Short-Term										
Student Ecologists	0	12	12	0	0	0	0	24	89%	
Expatriate	8	10	7	6	5	3	1	40		
Local	1	2	2	2	1	0	0	8		11%
								72		
TOTAL NFM								318		
4. PRODUCT DEVELOPMENT										
Long-Term										
Product Marketing Specialist (Expatriate)	0	12	12	12	0	0	0	36	24%	
Timber Specialist (Local)	0	6	12	12	12	12	3	57		
Non-Timber Specialist (Local)	0	6	12	12	12	12	3	57		76%
								150		
Short-Term										
Expatriate	2	7	8	7	5	1	0	30	68%	
Local	0	2	4	4	3	1	0	14		32%
								44		
TOTAL PRODUCT DEVELOPMENT								194		
SUBTOTAL: HOME OFFICE LOE								57		
SUBTOTAL: LONG TERM LOE								666		
SUBTOTAL: SHORT TERM LOE								194		
GRAND TOTAL TECHNICAL ASSISTANCE LOE								917		

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR) 07:22 PM
COUNTERPART PERSONNEL TABLE

23-Aug-93	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	TOTAL
1. MANAGEMENT/ADMINISTRATION								
La Paz/MDSMA								
Coordinator	12	12	12	12	12	12	12	84
Project Officer	0	12	12	12	12	12	12	72
Accountant	12	12	12	12	12	12	12	84
Secretary	12	12	12	12	12	12	12	84
Field Representative (Santa Cruz)	0	12	12	12	12	12	12	72
Santa Cruz / TA Contractor								
MDSMA M&E Specialist (Santa Cruz)	6	12	12	12	12	12	12	78
MDSMA M&E Specialist (La Paz)	6	12	12	12	12	12	12	78
TOTAL	48	84	84	84	84	84	84	552
2. POLICY / INSTITUTIONAL ANALYSIS								
MDSMA Policy Specialist	6	12	12	12	12	12	12	78
CDF Policy Specialist	6	12	12	12	12	12	12	78
TOTAL	12	24	24	24	24	24	24	156
3. NATURAL FORESTRY MANAGEMENT (NFM)								
CDF/Santa Cruz, Forester	6	12	12	12	12	12	12	78
MDSMA Research Coordinator	6	12	12	12	12	12	12	78
MDSMA Training Coordinator	6	12	12	12	12	12	12	78
TOTAL	18	36	36	36	36	36	36	234
4. PRODUCT DEVELOPMENT								
To be determined	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0
GRAND TOTAL	78	144	144	144	144	144	144	942

SECTION VI
MANAGEMENT AND IMPLEMENTATION PLAN

A. INTRODUCTION

The organization, management and administration of the project is described in Section V.A, 6. Detail is provided on the implementing agencies, overall organizational structure, project administration committee, advisory committee, counterpart and TA team staffing. This section describes the functions, roles and responsibilities of the implementing agencies and the TA team. A chart summarizing the phasing of key project activities is also provided.

B. FUNCTIONS, ROLES, AND RESPONSIBILITIES

Selected functions, roles, and activities for the management directorate and the various components are described below, along with respective responsibilities for the implementing agencies, or in some cases for the TA team itself:

<u>MDSMA</u>

Management & Administrative Directorate

- Overall project direction
- Coordination with other government agencies
- Chair advisory committee
- Fiscal and programmatic administration
- Identification of non-AID funding sources to complement project funding

Coordination of Research/Training Activities

- Coordination of research on environmentally/ecologically sound forest management practices, including role/importance of wildlife and on sustainable harvesting practices for non-timber products.
- Coordination of training of undergraduate and graduate students in scientific methodologies and techniques

Monitoring, Evaluation & Information Activities

- Monitoring/review of project activities and results (e.g. of research and forestry management practices)
- Monitoring environmental/ecological issues
- Data base formulation, maintenance, collaboration with other programs
- Reporting on project impacts and lessons learned

71.

- Dissemination/publication of research findings
- Public awareness and education of environmentally sound practices
- Networking among Bolivian groups and other Latin American environmental groups and forest industry associations

MDSMA, with CDF (or its replacement)

Natural Forest Management Component

- Forestry management research and dissemination
- Forestry training

Policy & Institutional Analysis/Development Component

- Studies of forestry and environmental issues
- Analysis of rules and regulations governing/constraining investment in forestry sector
- Workshops/seminars for public discussion of issues
- Assessments of potential implementing groups, public and private
- Technical advice on organizational structures
- Assistance in restructuring and administrative reforms
  Policy & Institutional Analysis/Development Component

TA TEAM with CDF: Santa Cruz

Natural Forest Management Component

- Development of model forest management plans
- Advice on sustainable forest harvesting practices
- Practical training in forest production practices to public, private and non-profit sectors
- Research and solutions for economically viable approaches to forest management

TA TEAM (counterpart to be determined, with MDSMA)

Product Development Component

- Timber and non-timber products
- Analysis of investment opportunities
- Value added processing/manufacturing
- Market research and development

- Assistance to existing and new enterprises to improve production, processing/manufacturing, transportation marketing practices, etc.

C. IMPLEMENTATION PLAN AND SCHEDULE

The project's activities will be implemented in phases, as indicated in the chart which follows:

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PHASING PLAN AND IMPLEMENTATION SCHEDULE
BOLFOR

	PHASE I				PHASE II				PHASE III						
YEAR	1				2				3				4		
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PHASE 1 (Years 1&2)																												
A. COMPONENTS																												
1. Policy & Institutional Development																												
Develop economic analysis plan	x																											
Conduct economic studies	x	x	x	x	x	x	x	x	x	x																		
Conduct workshops for debate of forestry law							x		x																			
Begin drafting new forestry law									x																			
Further assess/define project role																												
– SENMA/SC	x																											
– CDF/SC	x																											
Conduct strengthening activities																												
– SENMA/SC		x	x	x	x	x	x	x																				
– CDF/SC		x	x	x	x	x	x	x																				
Formulate M&E and reporting systems			x	x																								
Identify long term economics training candidate		x																										
2. Natural Forest Management																												
Reach agreements for mgt. assistance on sites																												
– Concessionaire	x																											
– Community group	x																											
Seek GOB approval to continue site work for LOP		x																										
Identify specific plots for field testing		x																										
Inventory forest lands on sites		x	x																									
Conduct baseline inventories		x	x																									
Undertake research																												
– Silvicultural				x	x	x	x	x	x																			
– Wildlife				x	x	x	x	x	x																			
– Ecological				x	x	x	x	x	x																			
– Sociocultural				x	x	x	x	x	x																			
Continue work in Bosques Chimanes	x	x	x	x	x	x	x	x																				
Formulate M&E systems				x	x																							
Identify long term training candidates	x		x																									
Initiate short term training			x																									

KEY
x = one time activity, completed in quarter
xxx = continuous over more than one quarter

PHASING PLAN AND IMPLEMENTATION SCHEDULE
BOLFOR

	PHASE I				PHASE II				PHASE III			
YEAR	1			2	3			4	5			6	7
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3. Product Development																				
Examine certification requirements		x																		
Develop plans to meet certification requirements			xx																	
Study/confirm market potential for 1 or 2 NTFPs				x																
Study sustainable practices for 1 or 2 NTFPs (continues into Phase II)				xx																
Review market for value added processing/green marketing for 1 or 2 timber products				xx																
Establish baseline data for timber and NTF products				x																
Formulate M&E systems				x																
B. SUPPORTING ELEMENTS																				
1. M&E and Information Systems																				
Consolidate reporting and M&E systems		xxxx																		
Consolidate baseline data organzation/procedures		xxxxxxx																		
Identify Bolivian groups with capacity to provide M&E services; initiate contracts		x																		
Acquire data bases		x																		
Establish information networking systems			xxxx																	
Support annual planning meeting			x		x															
2. Research Coordination																				
Establish criteria for res. program review/approval		x																		
Establish procedures for cross sectoral collaboratio		x																		
Formulate trng. programs for Bolivian/U.S. students to conduct research		x																		
Establish Bolivian university approved program			x																	
3. Training Coordination																				
Establish criterial for training program review/approv		x																		
Establish criteria to select LT trainees and universitie		x																		
Assist in selection and placement process		x																		
Send students abroad			x																	
Monitor LT participants			xxxx																	
Assist TA advisors in component trng plans		x			x															

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PHASING PLAN AND IMPLEMENTATION SCHEDULE
BOLFOR

	PHASE I		PHASE II		PHASE III		
YEAR	1	2	3	4	5	6	7
QUARTER	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
PHASE II (Years 3 & 4)							
A. COMPONENTS							
1. Policy & Institutional Development							
Contine economic analysis			xxxxxxxxxx				
Continue workshops for policy dialogue			x x x				
Present draft forestry law			x				
Formulate recommendations on policies, rules, regs, enforcement mechanisms, pricing incentives			xxxxxxxxxx				
Continue institutional development assistance							
– SENMA/ SC			xxxxxxxxxx				
– CDF/SC			xxxxxxxxxx				
2. Natural Forest Management							
Begin forest mgt. work beyond demo sites							
– Concessionare			xxxxxxxxxx				
– Community group			xxxxxxxxxx				
Conduct EAs or ERs on other sites			x	x			
Take forest inventories on other sites			x	x			
Initiate mgt. plans for other groups/sites			x	x			
Continue/modify initial research activities			xxxxxxxxxx				
Continue long term training			xxxxxxxxxx				
Expand short term training			x x x	x			
3. Product Development							
Work to meet requirements of certification, including assistance to certification unit			x x x	x			
Continue research on sustainability of NTFPs			xxxxxxxxxx				
Continue commercialization of initial products			xxxxxxxxxx				
Analyze markets for 1 or 2 additional NTFPs			x	x			
Conduct EAs, as needed, on additional products			x	x			
Analyze green and value added markets for 1 or 2 secondary timber species			x				
Initiate research on sustainability of these species (and continue into Phase III)			xxxx				
Begin mkting of new timber and NTF products			x				
Initiate enterprise assistance, if needed			x				

PHASING PLAN AND IMPLEMENTATION SCHEDULE
BOLFOR

	PHASE I		PHASE II		PHASE III		
YEAR	1	2	3	4	5	6	7
QUARTER	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
B. SUPPORTING ELEMENTS							
1. M&E and Information Systems							
Continue monitoring and reporting			xxxxxxxxx				
Evaluate work to date and make adjustments			x				
Begin dissemination activities for res. findings			x				
Initiate communications program			x				
Support annual planning meeting			x	x			
2. Research Coordination							
Monitor Bolivian/US student research projects			xxxxxxxxx				
Coordinate yearly research review			x	x			
Monitor collaboration of res. across components			xxxxxxxxx				
Assist in reporting on progress and findings			xxxxxxxxx				
3. Training Coordination							
Monitor progress of LT trainees			xxxxxxxxx				
Coordinate yearly training review			x	x			
Assist mgrs formulate plan for in-country training and courses abroad			x	x			
Support major increase in short term training			x x x x				
Provide logistical support for in-country training			xxxxxxxxx				
Report on training activities			xxxxxxxxx				

PHASING PLAN AND IMPLEMENTATION SCHEDULE
BOLFOR

	PHASE I		PHASE II		PHASE III		
YEAR	1	2	3	4	5	6	7
QUARTER	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
PHASE III (Years 5 – 7)							
A. COMPONENTS							
1. Policy & Institutional Development							
Continue economic research					xxxxxxxxxxxx		
Refine policy recommendations					x x x		
Troubleshoot institutional needs					x x x		
2. Natural Forest Management							
Reach agreements with other concessionaires and community groups					x		
Assist in taking forest inventories					x		
Assist in development of forest mgt. plans					x		
Conduct EAs or ERs as needed					x x x		
Continue ass't. to Phase I and II concessionaires and community groups					xxxxxxxxxxxx		
Promote adoption of NFM techniques					xxxxxxxxxxxx		
Evalute and report on results					x x x x		
Continue res. only as needed for certification					x x x		
Continue long and short term training					xxxxxxxxxxxx		
3. Product Development							
Oversea certification procedures					xxxxxxxxxxxx		
Continue res. on sustainability of harvesting					x x x		
Continue commercialization of previous products					x x x		
Analyze markets for additional NTF products					x x x		
Initiate research on sustainable practices for additional NTFPs					xxxxxxxxxx		
Promote green markets and value added products to entrepreneuers and community groups					x x x		
Provide information to assist entrepreneurs					x x x		
Expand enterprise assistance, as needed							

PHASING PLAN AND IMPLEMENTATION SCHEDULE
BOLFOR

	PHASE I		PHASE II		PHASE III		
YEAR	1	2	3	4	5	6	7
QUARTER	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
B. SUPPORTING ELEMENTS							
1. M&E and Information Systems							
Continue reporting, per agreed upon procedures					x	x x	x
Conduct environ monitoring special reviews, as needed					x	x x	
Do EAs or ERs, updates, as needed for certification					x	x x	
Support annual planning meeting					x	x	
2. Research Coordination							
Monitor research work by Bolivian and US students					xxxxxxxxxxxx		
Coordinate yearly research program review					x	x	x
Monitor collaboration on res. across components					xxxxxxxxxxxx		
Assist in reporting on findings of research					xxxxxxxxxxxx		
3. Training Coordination							
Coordinate yearly review of training programs					x	x	x
Monitor progress of LT trainees					xxxx		
Assist mgrs. in conducting in-country training and short courses abroad					xxxxxxxxxxxx		
Provide logistical support for in-country training					xxxxxxxxxxxx		
Report on training activities					xxxxxxxxxxxx		

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SECTION VII
PROJECT MONITORING, REPORTING, AND EVALUATION PLAN

BOLFOR is a seven year project, to start in FY 1993. Several U.S. and Bolivian institutions will be involved in its implementation. Constant monitoring is required to assure timeliness of the project activities and to provide the information for project corrections or reorientation if deemed necessary.

A. MONITORING AND REPORTING PLAN

The monitoring plan will assure the timely implementation of all project activities consistent with the project goals and objectives. The plan will track project progress and accomplishments and assure the timely collection, analysis and dissemination of data for effective evaluation of project impact. The plan will assist project management in the early detection of problems, bottlenecks, etc. that could jeopardize implementation.

The monitoring responsibility will be vested with the Project Manager, a representative of the USAID/Bolivia's Agriculture and Rural Development Office, who will be supported by the Project Implementation Committee.

The project calls for the development of a management information system (MIS) to monitor project progress, manage the project effectively, provide periodic reports to Mission management and to plan further programs. The project provides for the contracting of short term technical assistance for the development of the MIS. The project manager, working together with the Evaluation Officer and/or the Monitoring and Evaluation Specialist in the USAID/Bolivia Office of Development Programs, should determine if such assistance is required, and will prepare a scope of work for the development, installation and administering of the MIS. To ensure that the MIS provides a useful management tool, the overall approach will be a rapid appraisal feedback system through which members of the user group will receive updated information every six months. This approach will allow for the continued analysis of project goals and objectives to assure that reasonable progress is taking place, to identify problem areas and to take corrective actions.

There are a number of commercial computerized MIS database software programs which were designed to track activities under such a project. Suitable software will be selected and customized for entry and reporting formats suited to the characteristics of the project, to facilitate reporting by component managers, and to meet the needs of project management for control and reporting.

All project components will contain detailed objectives, work plans, output targets, and budgets. The activities in each component will be described in standardized format as a discrete subcomponent.

Annual work plans will disagregate component objectives into the activities to be initiated, continued, amended and terminated during the year in pursuit of those objectives. The project accounting system is designed to permit reallocation of expenditures as sub-projects may be dropped, split and/or merged.

Project tracking will be keyed to the project inputs and outputs in the project paper and the targets established in the annual work plan. Since each activity contributes to these outputs and targets, a project planning and budgeting system will be used to control and report at the activity level and consolidate to output levels. This task will develop a uniform activity data for reporting on progress.

Component managers will report to the MIS on budget execution and performance on each activity. Activity implementation data will be entered in a computerized data base for rapid retrieval and reporting. Progress and status will be summarized and compared with output targets at the component and project level in a quarterly component report to USAID and GOB project managers.

Component managers will report monthly on status and progress (budget execution, performance) by activity against work plan targets. Progress and status will be summarized in a quarterly component report (cumulative) tied to project component inputs, outputs, and targets. Budget expenditure information will be incorporated in the MIS and periodically analyzed for current management decisions and to provide a basis for work planning. The project accounting system is designed to permit reallocation of expenditures as sub-projects may be dropped, split, and/or merged.

Financial reporting by the contractor, in accordance with conditions established in the L/COM, will be done monthly as invoices are prepared and sent to USAID/Bolivia for review, approval and payment. The contractor's invoicing system will be structured in a manner designed to track commitments of funds, including life of project budget and periodic fiscal year obligations. The monthly invoicing will indicate total funding budgeted by major budgetary line item, amount invoiced in a particular month, amount invoiced to date, and balance remaining in a given line item.

B. EVALUATION PLAN

The evaluation plan for the project calls for two evaluations during the life of the project, as follows:

1. Mid-Term Evaluation

There will be a mid-term evaluation in year four. The evaluation will focus on preliminary impact and performance indicators. The evaluation will serve to validate the project's basic strategy and approach, and to determine if the activities carried out under the project are addressing several key program objectives: I) Increased forest value to discourage forest conversion; II) Improved public and private institutional capacity for sustainable resource use and environmental protection; III) Increased awareness of key decision makers of environmental protection and sustainable natural resource management issues; and IV) Improved policies for long term investment and protection of the forests. This evaluation should also determine the extent to which the project is contributing to the goals and objectives under the Mission's strategic objective "Reduce degradation of forest, soil and water resources and biological diversity protected".

The mid-term evaluation will include recommendations for the improvement of project implementation, and for changes or modifications to the project design.

2. Final Evaluation

The final evaluation will basically serve to determine the overall impact of the project in terms of the Mission strategic objectives and the specific goals, purpose and objectives of the project. This final evaluation will use the baseline data collected throughout the life of the project and will be the base for the indicators to be measured. All participating institutions, local and U.S., will be evaluated to determine their effectiveness in carrying out the activities under the Project.

3. Other

In addition to the two formal evaluations mentioned above, and at the discretion of the Project Manager assisted by the Monitoring and Evaluation Specialist, other studies, assessments or evaluations may be carried out. These will serve to determine if changes, adjustments and/or corrections will be required in order to improve project management and implementation.

The mid-term and final evaluations as well as selected studies and assessments, will be carried out by external contractors, and the SOW for these evaluations will be developed by the Project Manager with the assistance of the Monitoring and Evaluation Specialist.

SECTION VIII
AUDIT PLAN

For that portion of the project which will be implemented by contract with a U.S. institution, AID audit standards require compliance with an Office of Management and Budget Circular A-133-like program, which provides for an organization-wide systems audit rather than a project-specific financial and compliance audit. Responsibility for obtaining these audits rests with the U.S. contractor, which must coordinate the effort and scope of work with a cognizant U.S.-based federal agency. The Overhead and Special Cost and Contract Branch (OP/PS/OCC) of the AID office of Procurement is responsible for coordinating with the U.S. contractor and for ensuring compliance. The Mission Regional Contracts Office will advise OP/PS/OCC when the contract is signed.

For U.S. contractors, AID requires not less than bi-annual U.S.-based audits, which provide an opinion regarding a given institution's compliance with laws and regulations, a statement of positive assurance on items tested and negative assurance on programs that were not tested, a presentation of material findings, the relationship of the findings to particular awards as appropriate, and the auditor's recommendations for corrective action. Sample testing of various USG grants and contracts is used to establish the contractor's ability to adequately manage and account for federal monies, in compliance with Generally Accepted Accounting Standards and Generally Accepted Government Accounting Standards. This type of audit precludes the necessity of performing single audits of individual federal awards such as the contract contemplated in this project. However, the primary U.S.-based contractor is responsible for ensuring that all non-U.S. sub-recipients receiving $25,000 or more in annual AID funding are audited annually by U.S.-affiliated firms operating in Bolivia, in accordance with OMB Circular A-133. The cost of these audits should be built into the budgets for the corresponding sub-recipient activities.

Since negotiated overhead rates should include funding for U.S.-based contractor audits, the Mission is not required to budget for audit of the Chemonics contract as a direct project cost. Again, for Chemonics' non-U.S. sub-recipients, the corresponding agreements should include funding for audits.

The PL 480 monies which will provide funding for the MDSMA will, in fact, be subject to annual financial and compliance audits in accordance with PL-480 Secretariat regulations. These audits are funded with PL-480 local currency, and the cost is included in the PL-480 Agreements. The USAID Financial Analysis Section will serve as liaison for audit purposes.

The project includes funding for one project specific, non-federal audit during the life of the project. This has been budgeted at $50,000 and is likely to occur in about year 2 of the project, under the direction of RIG/A/T.

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SECTION IX
SUMMARY OF ANALYSES

A. TECHNICAL ANALYSIS

1. Biodiversity Protection and Research and Training

Bolivian forests are being logged at a rapid rate, technically sound forest management efforts are exceedingly rare, the data base for sustainable forestry is virtually non-existent, and few Bolivians have the training required to address the technical and scientific issues upon which ecologically, socially, and economically acceptable forest management practices could develop. Furthermore, some holders of large forest concessions (upon whom the fate of much forest depends) behave as if they do not recognize the need for sound forest management. The project will contribute towards development of a cadre of trained forest managers and researchers and will help increase awareness of the economic and ecological benefits of sound forestry methods. Forestry training, research, forest management demonstrations, and information dissemination will be inextricably linked in this project.

A trained cadre of forestry professionals and technical staff is a prerequisite for sustainable forest management in Bolivia. Expatriate "experts" have a role to play as research advisors, trainers, and independent project evaluators, but the primary and long-lasting results of the project should be enhanced human capacity in Bolivia to protect and manage forests. Through communication of its results to others responsible for the fate of forests in Bolivia, elsewhere in Latin America, and the world, the project's impacts will be enhanced.

Forest management techniques for increasing the sustainable yield of commercially valuable forest products will be developed and tested during the BOLFOR Project. Given the paucity of information about the ecology of Bolivian forests, much basic data will need to be collected in the process of selecting appropriate silvicultural approaches. There are, however, a number of fairly standard silvicultural techniques that will be tested and applied early-on by the project.

There are some educational institutions in Bolivia that provide training on topics related to forest protection and sustainable use in Bolivia. The general quality of the education, however, is reportedly quite low. University faculty repeatedly mentioned the poorly developed basic skills of many of their students. Training for field staff is also very limited. Finally, there are apparently no institutions of higher learning in Bolivia where scientific methods are well taught. The result of this deficiency of trained researchers and lack of training in research techniques is that there is virtually no Bolivian capacity to develop a scientific basis for natural forest management. BOLFOR staff will play a key role in working with local Bolivian scientists to enhance this national capacity.

During the initial phases of the BOLFOR project, much effort will be expended on research training and forest inventory. The project will have close ties, therefore, with Bolivian universities, including the herbaria in La Paz and Santa Cruz, and with other research groups. Participation in training courses and eligibility for financial support for research will not be restricted to any particular group or geographical area but priority will be given to projects that are well integrated into the overall BOLFOR project design.

2. Natural Forest Management

Although most Bolivian forests could be managed sustainably and profitably, forest management (as opposed to uncontrolled timber "mining") is virtually unknown in Bolivia. This situation needs to change rapidly or the commercial potential of most accessible forest in the country will be severely diminished. The main contribution of this component of BOLFOR will be to develop and demonstrate appropriate inventory techniques, forest engineering methods, harvesting technologies, and timber stand improvement treatments.

There are apparently no data from Bajo Paragua Forest Reserve on the effects of logging on forest structure, composition, ecosystem function, or the sustainability of resource use. On the basis of the EA team's visit to the Moira Concession in Bajo Paragua, however, some of the effects of logging can be described. Furthermore, to the extent that the conditions in Baja Paragua resemble those in Chimanes Forest Reserve, effects of current logging practices in the former can be assumed from studies conducted in the latter.

Forest management is currently not practiced in the Bajo Paragua (nor elsewhere in Bolivia to the best of our knowledge); the forest is simply "high-graded" or "creamed" for high value logs. Also, felling, timber extraction, and timber hauling practices cause more damage than is either necessary or cost effective. Because proper felling techniques are not practiced, considerable damage is done to other standing trees and the general ecology as well.

Unnecessary damage to the forest and inefficient utilization of the trees felled is also due indirectly to the policy of assessing taxes outside of the forest. The policy makes it to the logger's distinct financial advantage to extract from the forest only the choicest logs. Substantial quantities of valuable timber are left to rot on the forest floor or at log landings. The policy component of the project will promote alternative revenue collecting schemes and incentives such as technologies for adding value to wood not suitable for sale as sawn timber (e.g. mahogany shorts).

The intensity of logging in Bolivia will increase in the near future. Many tree species that are harvested in Brazil are currently not harvested in Bolivia, apparently due to higher transport costs. As markets expand and stocks of well-known and high-valued species are depleted, these other species will likely be harvested in Bolivia. Increased harvesting intensity will greatly increase logging damage, especially if current uncontrolled practices continue.

To the extent possible, the project will use market forces to motivate change from destructive to less destructive timber and non-timber forest product harvesting practices. One already significant and growing market force springs from worldwide concern for the continued existence of natural forests and the continued supply of forest products. This concern is being manifested in an increasing number of tropical timber boycotts and in the emerging "green" consumerism. The threat that their forest products will not have access to markets in environmentally concerned parts of the world in one reason for the widespread interest of Bolivian forest product exporters in "eco-certification." Pronouncements by the Bolivian government that all timber will be harvested in a sustainable manner before 1995 (Pausa Ecológica) and the International Timber Trade Organization's similar worldwide target for the year 2000 are contributing to the interest in eco-certification of Bolivian timber and timber products. Eco-certification also serves as an organizational theme for the BOLFOR project insofar as it incorporates forest protection, sustainable forest use, monitoring of the effects of forest management, and marketing of forest products.

While there are a number of fairly substantial changes in forest-use practices that need to be made before eco-certification is a possibility, Bolivian forest managers are actually closer to this goal than their colleagues in many other tropical countries.

On the matter of site selection, Bajo Paragua will be the project's initial comprehensive pilot site. This encompasses a large concession - Moira, and Lomerio - an area where the Chiquitano indigenous community is managing lands.

Choice of a specific geographic area does not preclude the choice of other sites at later date or the implementation of specific, targeted activities (e.g. applied research) at other sites early in the project. This site specific focus will allow exploration in greater detail of the potential impacts of project activities. Lessons learned during this process will help the implementation team to more precisely define subsequent assessment requirements as project activities are replicated or expanded into other areas of the Bolivian Oriente.

Another location for complementary forestry management, research and training is the Bosque Chimanes. The studies on mahogany being carried out at this time are characterized by their excellent design and ample replication. The research team is investigating the factors that influence mahogany regeneration and growth, using this information to develop management strategies, and estimating economic rents from different management strategies. They are addressing issues of biological sustainability as well as timber yields and plan to develop training course materials. They set a very high standard for other researchers in Bolivia. Furthermore, some of the designs developed in Bosque Chimanes should be replicated in other forests and with other species.

3. Product Development

This analysis includes several topics: timber products, non-timber products and enterprise development.

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The constraints to be addressed are not unique to this sector and include: lack of knowledge (at the enterprise level) of market opportunities and requirements; inadequate information systems (for data on market prices, product quality and sanitary standards, rules and regulations governing imports to foreign markets, potential buyers/importers/distributors, technical materials); lack of modern processing and quality control techniques and technologies; lack of knowledge of alternative uses of raw materials or by-products of the production process, non-sustainable cultivation and harvesting practices; high transportation costs; lack of proper packing and storage techniques; and access to financing for new and expansions of existing enterprises.

For timber products, mahogany, cedar and oak comprise about 97 percent of the reported export value of rough sawn lumber, which itself is the largest single classification of wood exports amounting to about 81 percent of all wood exports. Mahogany alone represents about 72 percent of the trade. The primary additional species is cerebo or sebo which is used for plywood. Plywood exports represent about 10 percent of the value of wood exports. The U.S. is the largest market. The two key components in lessening the pressure on the forests and in giving financial incentives to the concessionaires to protect the forests, are 1) greater use of the wood currently being cut, and 2) use of other species to generate economic value.

Current estimates of operating profit margins for logging, sawing and exporting are 40 to 50 percent. Part of the reason for these high margins is that there are very low stumpage fees, i.e. raw material costs are extremely low. Pressures to limit the importation of tropical hardwoods are increasing and are likely to lead to outright bans if products cannot be certified as being produced in a sustainable manner.

Current production capabilities are concentrated in logging and sawing. There are a few installations for slicing logs into veneer, for plywood and for particleboard. All other categories of products only count for a few hundred thousand dollars annually. These products would seem to offer the greatest potential for future industrialization and employment. The industry is comprised of medium and large companies, most of which are also cutting logs; small firms and family owned enterprises selling mostly to the domestic market; and artisans. The most immediate opportunities to generate value added would be with the medium and larger enterprises because of their access to capital.

Non-timber products encompass a broad range of products and enormous potential. At the outset, the opportunities would seem to lie with Brazil nuts, rubber/latex and palm hearts, not surprisingly, Bolivia's three major NTFP exports. Other prospects such as cusi palm oil need considerably more study, including research on whether the products can be harvested in an ecologically sustainable manner.

The term **enterprise** is meant to include for-profit firms of all sizes as well as community-based and indigenous group associations and cooperative enterprises. These firms are involved in timber and non-timber products and service. Further, this is not a single industry; there are a diverse range of product categories (from sawn lumber to

furniture, nuts, oils, food additives, latex, etc) and end markets (from industrial processors to final consumers abroad).

To achieve the component's objectives, focusing on products or services alone is not likely to be sufficient. The enterprises in this sector are fragile, often lacking managerial, financial, technical and marketing expertise and knowledge about these topics. Thus, reaching the commercialization objectives of increased value and volume of products produced and sold will require a more comprehensive set of services than just the production and marketing aspects.

B. ENVIRONMENTAL ANALYSIS

To achieve the dual goals of production and protection, the project will require tight integration of components. The capital intensive business of processing forest products cannot be sustained without the forest, and with certification the products will not be able to be sold abroad unless equal attention is paid to maintaining biological diversity and forest cover. Since putting this novel concept into practice is new, it must be supported by applied research, training and broad dissemination of results in a favorable policy environment. This complex process must be closely monitored and timely adjustments made if the goals are to be achieved.

The project encompasses the lowland forests of eastern Bolivia. However, initially the geographic focus is expected to be on the Moira and Lomerio sites. This site specific focus will allow the EA to explore in greater detail the potential field-level impacts of project activities.

A fundamental aspect of this project design was the Environmental Assessment. Unlike many projects in which the EA is completed after design, this EA was undertaken at the outset so that information could be obtained and approaches agreed upon to preserve and protect the fragile environment of Bolivia's lowlands. These approaches were also aimed at leading to techniques which will improve the likelihood of sustainable harvesting and production of forest-based products and services. Thus, the research, training, natural forest management, and monitoring and evaluation activities in particular have been structured based on the recommendations of the EA.

The principal function of the Environmental Assessment during the project design was to serve as both a check and a design guide. The EA assured that the design recommendations on production activities to enhance the economic value of the forest were balanced by protection activities to maintain the ecological values of the forest.

The following mitigation measures will enable USAID/Bolivia and the BOLFOR Project participants to offset, minimize, or avoid any possible adverse environmental effects and to ensure that project activities are carried out in an environmentally sound manner.

1. Prior to the establishment of the BOLFOR Project research plots on the Moira concession, a binding agreement (to assign responsibilities and access to the land) should be reached between the Project, the concessionaire (or community group) and appropriate public and private authorities.

2. The BOLFOR project should investigate the role of natural and anthropogenic fire in the Lomerio and Bajo Paragua forests, and, as appropriate, institute fire control programs at both sites.

3. Project activities at Lomerio should support the training of community members in sustainable forest and wildlife management.

4. The BOLFOR project should support research into the subsistence use of wildlife in the Moira concession and Lomerio community.

5. BOLFOR project activities involving work with local communities (both at Lomerio and with the seasonal laborers employed by the Moira concession) should make particular efforts to ensure that research is conducted and technical assistance provided in a manner most appropriate for local social conditions.

6. Surface surveys of archeological artifacts, and information on culturally important sites (e.g., sacred lakes, hills, etc.) are required in any areas where the Project may be involved in construction or other activities disturbing existing habitats.

Future environmental assessments (technically, amendments to this environmental assessment) should be conducted for any planned project activities that are not explicitly addressed in this EA and that may have significant environmental impacts.

C. SOCIAL SOUNDNESS ANALYSIS

The social soundness analysis is based on a field visit to Bajo Paragua and Lomerio, extensive discussion with members of the design team, interviews with peasants, Chiquitanos, forest concession managers and workers, the technical staff of Ayuda Para el Campesino Boliviano (APCOB), the leadcrship of the Central Indigena del Oriente Boliviano (CIDOB) and the Central Intercomunal de las Comunidades de Lomerio (CICOL), and the director and technical staff of the Instituto Indigenista Boliviano. The analysis is also based on two technical reports on Gender Issues and Indigenous Peoples in the Lowlands.

One of the most remarkable, though not unexpected, findings of the Gender Issues Technical Report is the dearth of information on the subject. The multicultural nature of the population in the lowlands requires site specific studies, if project actions are to adequately address those issues. Such studies are not feasible until the sites are selected for implementation of project activities. Gender-determined access to, and ownership of resources varies considerable among the 29 indigenous peoples groups, and the several categories of non-indigenous peoples. It also varies according to national law and customary

law, depending on whether it is an internal (to the group) or external matter; in the latter case only national law is recognized or imposed. Ethnic membership, gender, residence, social and economic status are all variables that affect access and use to resources in this very diverse population of the lowlands.

Over the past four decades, Bolivia has experienced a gradual and steady shift of its population from rural areas to urban centers and from the highlands to the lowlands. A parallel shift has taken place in the economy from one dominated by mining in the highlands to one in which commercial agriculture and forestry play a growing role. The Bolivian lowlands, which until only a few years ago were perceived as a vast and sparsely populated region with apparently inexhaustible resources, are now under siege by what can be characterized as an avalanche of competing claims over its natural resources by forest concessionaires, large scale commercial agricultural and livestock operations, growing number of peasants colonist, mining and oil concessions, resurgent indigenous populations, and national and international environmental protection organizations.

Long neglected reform of the laws and institutions of land/natural resources allocation and administration have contributed to creating a situation that will take years to put in order. It is not uncommon to find land which has been customarily owned and used by indigenous peoples for centuries over which there are two land titles granted to different individuals by different government agencies, a forest concession, and a mining concession. All of these "rights" over the land are perfectly legal under a variety of laws that deal separately with land tenure, colonization, forest concessions, mining concessions, and indigenous communal territories. In this kind of legal environment, conflict resolution in not so much a question of right or wrong, but of the power to use the system in one's favor.

In the next five to ten years, these competing claims over the resources of the region will sort themselves out through the national political system. If the current ten year democratic political system persists, the resolution of actual and potential conflicts may be resolved fairly. The focus on the lowland's resources and their uncertain future have contributed to an unprecedented effort by the Bolivian government to modernize and upgrade its legal and institutional capacity to protect the environment, and to deal with the increasing demands on the natural resources of country and the lowlands in particular. Part of the reforms underway include the recognition and protection of indigenous peoples rights to their traditionally held territories and their resources.

Important changes in such things as environmental legislation and institutional roles and responsibilities (in particular the creation of the new Ministry of Sustainable Development and the Environment) are now in process, though they are only beginning to be implemented. They have a long way to go before significant and noticeable changes take place in the actual use and management of the natural resources of the country, and especially the resources of the lowlands region. What is more, additional and related reforms are needed in the allocation, administration and tenure of land, forest, mining and oil concessions, local participation and governance, and administration of justice, if the goals and objectives of the new, comprehensive environmental legislation are to be accomplished.

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Fortunately, those changes seem to be in the making. There seems to be consensus among the main political parties on the need to move ahead with the comprehensive overhaul of the laws and institutions that govern the country. This includes modifications in the constitution of the country, decentralization of central government functions, and some devolution of power to the regions. There is widespread recognition that many of the problems at the local and regional level are due to a highly centralized system of government and administration which is less than optimally effective, and which needs to be changed if the needs of the country and its citizens are to be met.

In summary, the project will be implemented in a national context that is undergoing a process of transformation. With this social and political context in mind, the project design team has aimed at maximizing the outputs of the project by carefully selecting the institutions it will work with, and the activities it will undertake. Impacts of the project will take place at the national and site specific levels, including: availability of reliable information for policy makers; formation of human resources in a variety of technical fields and at various levels; better management systems for forest concessions, and for non-timber enterprises. Project activities will also have significant positive impact on rural communities and indigenous peoples through a series of programs aimed at valuing their technologies, identifying non-timber forest products with commercial potential, and incorporating them into a community-based research and monitoring network to assess and document the impacts of human activities on their environments.

Social variables have been carefully considered during project design, with two anthropologists (one Bolivian, one U.S.) figuring as key members of the design team, focusing in particular on gender and indigenous people's issues. Their insights have helped structure proposed project activities, from choice of initial pilot sites (e.g. the Chiquitanos Indian community of Lomerio) to strategies for selecting new forest products for development and promotion (e.g. building on a base of indigenous peoples' knowledge about forest flora and fauna). Similarly, an anthropologist will be part of the project implementation team, and this will continue to insure that important social variables are factored into project planning and implementation. The project has been found to be feasible in the Bolivian social context.

D. POLICY CONTEXT ANALYSIS

The purpose of this analysis is to summarize the positive and negative aspects of current and anticipated laws, regulations and policies governing the forestry and environment sectors in Bolivia, and based on this analysis, to recommend a program of activities for project implementation. The analysis presents a brief summary of each law or regulation along with a discussion of their respective strengths and weaknesses; outlines the importance of the broader context within which forest sector policies are proposed and implemented, including factors related to the institutional, economic, and ecological setting; and presents a recommended program of activities for the policy component.

Though comprehensive, the content and implementation of the forestry law in particular has been a continuing source of controversy that should be rectified by passage of a new law. A number of the more significant areas of concern include:

Allocation of cutting rights. The mechanism by which cutting rights are granted is subject to abuse and is biased against community and indigenous groups and small logging firms.

Tenure security. Although the Forestry Law allows for concession lengths of up to 20 years, few long-term concessions have been granted to date. Most are annual or three-year contracts with automatic renewal, regardless of management practices.

Management plans and harvest controls. The Forestry Law provides that the quantity and timing of harvests be controlled by management plans written for each concession. Minimum cutting diameters are used as an additional means of controlling the rate of harvest. Neither, however, has been effectively implemented.

Timber pricing. Timber is sold to concessionaires at rates established by a series of taxes levied on the volume of logs removed from the forest. Available data suggest that current rates are set far below the actual value of the timber.

The Pausa Ecológica Histórica is an interim measure designed to address threats posed to the integrity of the country's natural resources by prevailing exploitation. To allow time for a more effective policy framework to be developed, it places a five-year moratorium on the granting of additional timber concessions. A number of the policies established in the regulations to the Supreme Decree are listed below.

Concession length. No additional short-term timber contracts will be offered. Only long-term (20-year) concessions will be allowed and those with 1-, 3-, or 10-year contracts can apply for new concessions with 20-year terms.

Timber taxes. Regional development corporations are required to invest revenues derived from logging in forest management and protection projects.

Management plans. Detailed guidelines are provided for the development of timber management plans. CDF is directed to establish technical departments to oversee inventories and the implementation of management plans. The evaluation and implementation of plans is to be shared jointly by the former Ministry of Agriculture and Peasant Affairs (MACA) and the former National Environmental Secretariat (SENMA).

Wood exports. Beginning in 1995, sawnwood exports will only be allowed from managed forests that are certified by SENMA and MACA.

Community forests. Community groups are to be given priority access to cutting rights in approved areas outside of permanent production forests.

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Nontimber products. Certain forests will be established that are dedicated solely to the production of rubber and Brazil nuts. Harvesting of palm hearts without adequate reforestation is prohibited.

SNAP. The MDSMA is responsible for establishing and maintaining a national system of protected areas (Sistema Nacional de Areas Protegidas, or SNAP).

Concession ownership. Logging companies are prohibited from having more than one concession.

Protection of flora and fauna. Concession holders are declared responsible for the protection of flora and fauna within their cutting areas, are required to discourage hunting and to provide meat from livestock for their workers.

The policy context for the project involves more than just the legal framework within which the forestry sector operates. Equally important, or perhaps more so, are factors related to the institutional, economic, and ecological setting within which policies are implemented.

In Bolivia, as in many countries, there is a large gap between the stated objectives of laws and what can actually be accomplished on the ground. As noted, the institutional capacity of the Centro de Desarrollo Forestal and other government agencies responsible for forest management and protection in the country has been extremely weak. As a result, enforcement of existing regulations is difficult at best. In addition, little or no economic or ecological information currently exists that could be used to guide the development and implementation of rational government policies. The intersection of what may be ecologically or silviculturally desirable and what is financially and economically feasibly is largely unknown.

There is an urgent need for basic information on a host of issues facing forest sector management in Bolivia. Policy reform is needed. But more important is the need for biological, economic, and silvicultural information upon which these reforms can be based. At present, the policy debate in Bolivia is based far more on slogans, rhetoric, and personal bias than on concrete information.

Of course, Bolivia is not alone in the need for policy reform to support sustainable forest use. However, much of the country's new environmental legislation (e.g. the Pausa Ecológica, the General Environmental Law) is both informed and intelligent, and indicates an improving policy context. Indications are that the new GOB administration will take sound resource use even more seriously than did the last, and President Gonzalo Sanchez de Lozada has publically expressed his strong support for such initiatives, in forums ranging from meetings with Vice President Gore and his environmental advisors, to public debates sponsored by local environmental NGOs. The new commitment is also reflected in the nation's changing institutional context, with creation of the new "super-Ministry" for

Sustainable Development and the Environment. Such developments indicate that the project is feasible in the Bolivian policy context.

E. ECONOMIC ANALYSIS

This analysis examines the economic viability of the project. The analysis in Annex D5 presents a brief overview of the project setting, including a discussion of current trends in the use of Bolivia's forest resources; provides a rationale for the economic analyses contained in this report and a discussion of information on project benefits and costs needed for monitoring and evaluation during implementation; presents a discussion of the reasonableness of assumed project benefits under a worst case scenario; and presents a comparison of estimated benefits to planned project expenditures.

The project concentrates on laying the groundwork for policies and investments that will yield economic benefits in the future, or "second tier" results. The forest research component, for example, will provide the basis for more sustainable and efficient management techniques and improved natural resource policies - the first tier. Over time, the adoption and implementation of the new techniques and policies will result in measurable financial and economic benefits - the second tier. However, it is not possible to specify in advance precisely what techniques will be developed, what policies proposed, or the extent to which either will be adopted, or in the case of policies, actually enforced. It would therefore be difficult to provide precise ex ante evaluations for most project components.

Nevertheless, rough estimates of the type of private sector impacts that may result from project investments can be made and compared to planned project expenditures. An illustrative analysis of this sort is presented. In addition, some measure of the reasonableness of project expenditures can be gained by comparing them to the value of the resources at risk from unsustainable management.

A very simple way to consider whether the likely benefits of this Project are reasonable is to compare planned project expenditures to the value of forest production in Bolivia, that is, to one component of the value of the resource whose use the project is trying to influence.

Project expenditures represent roughly 3.0 percent of the annual value of the country's forest production and 1.5 percent of its value over 15 years (some project benefits, such as basic information on the growth and reproduction of commercial tree species, are likely to accrue well after the project has ended). When viewed in this light, project expenditures do not seem unreasonable.

A better way of assessing the reasonableness of project investments is to compare planned annual expenditures to estimates of the type of benefits that may result from these expenditures in the future. The Economic Analysis indicates that a review of 50 agricultural

projects with components similar to this Project shows returns ranging from 11 percent to 130 percent. Only 9 reviewed projects yielded returns of less than 30 percent.

Accordingly, an illustrative cash flow yielding an IRR of 10 percent over 15 years was constructed to represent a worst case scenario. Benefits and costs in this illustration were tabulated for discount rates of 3 percent and 25 percent and a sensitivity analysis was performed. The 3 percent discount rate approximates the U.S. Government's long-term borrowing cost. The 25 percent rate represents the returns realized in recent years from sound private sector investments in Bolivia.

Since the illustrative cash flow was constructed to produce an IRR of 10 percent in 15 years, any discount rate less than 10 percent will show a net present value greater than zero. More interesting, of course, is a sensitivity analysis indicating the period of time required to realize specified benchmark returns. The sensitivity analysis was done for the worst case scenario and a best case scenario with net economic benefits from second tier activities sans project investments of three times such levels of the worst case scenario. As can be seen in the following table, the worst case scenario produces an acceptable return based on the U.S. Government's long-term borrowing costs (adjusted for inflation) in 12 years, but based on the "opportunity costs" of alternative sound private sector investments in Bolivia, the Project would be rejected. The best case scenario, however, achieves the 25 percent opportunity cost return in only 15 years. The actual outcome can be expected to lie somewhere between these two extremes.

Conclusion: The economic and social returns expected from this Project are acceptable.

PERIOD NEEDED TO REALIZE BENCHMARK RETURNS

(Number of Years)

Benchmark Return (%)	Scenario	
	Worst Case	Best Case
3	12	6-1/2
10	15	7
12	18	7-1/2
25	*	15
* approaches infinity		

Note: "Number of years" refers to the years after year "0," which is the first year of the Project

F. FINANCIAL ANALYSIS

The financial annex contains detailed spreadsheets for the budget and notes explaining the assumptions made.

The financial analysis reviewed the costs of renting airplanes and concluded that a $250,000 grant to FAN, in return for guaranteed access to air transportation services from FAN at cost, over the life of project, is very cost effective (see Annex D6, "Financial Analysis"). The analysis reviewed sustainability of the activities after the project ends and funding terminates and concluded that the costs to SENMA (and, presumably, to the MDSMA that has replaced SENMA) and the CDF will be relatively modest. The cost of procurement was reviewed and a conclusion reached that commodity purchases can be cost effectively handled by the institutional contractor, AID and FONAMA (now under the responsibility of the MDSMA). Finally, the analysis concluded that the impact of certification on project results could be very significant. If certification is not required by the importing countries, the Bolivians will have to rely much more extensively on enforcement (rather than economic incentives) to protect its forests.

G. ADMINISTRATIVE ANALYSIS

The institutional and technical analyses concluded that the project's goal and purpose could best be realized and its components managed through an administrative structure that shares responsibilities for the production and protection objectives. The analyses recommend that no single agency be responsible for the entire range of activities. Rather, that both

public and private sector groups be involved, sometimes as primary implementing agencies and sometimes in a secondary, or support role.

FONAMA was recommended as the primary counterpart or executing agency under delegation from the Ministry of Planning and Coordination (the grantee). FONAMA was chosen because of its experience, albeit recent, in managing programs in the environmental and natural resources areas. Also, it was selected because it represents neither pure conservation (as would have SENMA) nor pure production (as would have MACA/CDF) and because it can play an important policy formulation role though its coordination functions among government agencies. SENMA was intended to have important and prime implementation responsibilities in the areas of protection policy, monitoring and evaluation and information networking and MACA/CDF the same for production policy. However, important institutional developments have taken place since initial project design, and a new "super-Ministry" of Sustainable Development and the Environment (the MDSMA) has assumed the functions of SENMA, and now houses FONAMA. This represents an important step forward in Bolivian environmental affairs, and should help achievement of project goals and objectives.

H. INSTITUTIONAL ANALYSIS

This analysis presents a general overview of the Bolivian institutions that will be involved in project implementation. The analysis includes information on the evolution of the legal framework and institutions themselves as well as conclusions about institutional strengthening needs.

The Nation's General Forestry Law was passed in 1974. Article 67 from this law created the CDF as a decentralized entity with administrative autonomy. As a result, this law gave Bolivia's forestry administration to CDF.

In 1988, the Undersecretary for the Environment and the Undersecretary for Renewable Natural Resources at MACA were both created so that the government would have an adequate representative to channel international initiatives to promote environmental projects in Bolivia.

In January 1990, the Historical Ecological Pause stipulated in Supreme Decree 22407 was enacted. It was intended to reconsider the nation's development processes and their environmental impacts. Many believe that this move opened the doors for environmental management previously unseen in the country.

In December 1990, the Fondo Nacional para el Medio Ambiente (FONAMA) was created by the Supreme Decree Law 22674 and ratified in the General Law for the Environment Number 1333 on June 15th, 1992. FONAMA was made accountable to the Presidency of the Republic as an administratively de-centralized entity, with autonomous management. FONAMA aimed at organizing, programming, and administering investment in environment and natural resources management.

In January 1991, the Secretaría General de Medio Ambiente, SEGMA, which later became SENMA, was created. It was accountable to the Presidency and was given a trans-sectorial nature and a hierarchy adequate to carry out its functions. Until recently SENMA was the ruling body for environmental management in Bolivia; it was in charge of designing and establishing policies to promote, orientate, regulate, and monitor environmental management.

SENMA made a priority the objective of "counting on state institutional capabilities to carry out a comprehensive and efficient environmental management at a national, regional, and local level within the framework of environmental policies established." To achieve greater success in this objective, SENMA wanted to initiate the development of regional and local environmental management, including the central and local governments in a real application of the decentralization concept. According to SENMA, establishing the Consejos Departamentales de Medio Ambiente, CODEMAs, (local councils for the environment), and the Secretarías Departamentales del Medio Ambiente, SEDEMAs, (local secretariats for the environment) would be a high priority for the future.

In August 1993, shortly after assuming office as President of the Republic, Gonzalo Sanchez de Lozada decided to give greater weight to environmental affairs in his administration, and announced creation of a new "super-Ministry" for Sustainable Development and the Environment (the MDSMA). This new entity will assume the previous functions of SENMA, selected functions earlier assigned to MACA, and will house, and no doubt modify, FONAMA. Creation of the new Ministry has drawn praise from many quarters, including from an environmental team sent down by Vice President Gore to help the Sanchez de Lozada government with transition planning. It represents a major step forward in Bolivian environmental affairs, and should provide an institutional context even more conducive to achieving project goals and objectives than that under the previous administration. Of course, this new Ministry will benefit greatly from the technical and institutional assistance that BOLFOR will provide.

A number of other secondary implementing organizations, such as APCOB, FAN and the National Forestry Chamber, are also to be involved in the project as subgrantees.

Not surprisingly, the analysis found significant strengths in some and considerable weaknesses in other institutions. Of note, until a new forestry law is passed and CDF's responsibilities are realigned and it is restructured, BOLFOR will work on a limited basis and only with the Santa Cruz office, except in the policy area where national level work to effect policy changes will be undertaken.

The analysis concluded by recommending that a limited amount of short term technical expertise be devoted to strengthening the institutional capacity of SENMA to establish SEDEMAs and CODEMAs in Santa Cruz and to improving the technical capacity of CDF in Santa Cruz to review forest management plans and monitor compliance with the laws. This strengthening was seen as necessary to fulfill the objective of building the capacity of Bolivian organizations so that they are able to effectively participate in the

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certification process and mechanism that will be established under BOLFOR. Of course, these conclusions remain equally valid under Bolivia's new institutional context for environmental affairs. The MDSMA and the CDF will need the strengthening outlined above, if they are to effectively assume their roles as key GOB entities for environmental research and management.

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SECTION X
CONDITIONS AND COVENANTS

Conditions and covenants to help insure that BOLFOR meets its goals and objectives are the following:

Conditions

AID has the right of review and approval of key counterpart personnel (prior to disbursement of local currencies for counterpart staff salaries), to include:

- MDSMA coordinator (La Paz)
- MDSMA field representative (Santa Cruz)
- CDF/Santa Cruz forester
- MDSMA M&E specialist
- MDSMA-contracted Research coordinator
- MDSMA-contracted Training coordinator

Covenants

GOB agrees to work with private and/or community groups to assure legally-binding BOLFOR access to lands on which demonstration and pilot work will be carried out during the life of the project.

GOB agrees to make every effort to pass a new forestry law that will support sustainable forest use.

GOB agrees to make creation of an independent, internationally recognized certification mechanism a priority, with such a mechanism in place and operational no later than 1996.

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SECTION XI
MAJOR PID, DESIGN, AND IMPLEMENTATION CONCERNS

A. PID CONCERNS

The PID expressed a desire that the Design Team focus on several concerns:

1. Relevant Experience with Similar Projects

The design team included members who had direct experience with natural forest management programs in Peru, Costa Rica, Surinam, Guatemala, and Honduras, and with on-going research in Bolivia. A literature search provided additional published information on natural resource management of tropical forests, and discussions with many of their authors uncovered additional unpublished information. A dozen papers were commissioned on relevant topics from professionals with insight and personal experience with these topics in Bolivia. The principles generated from this background information were examined for relevance and applicability in interviews with informed staff of Bolivian institutions. This experience and information provided the underpinnings for BOLFOR design and its technical analysis.

2. Financial and Economic Considerations

The project design places approximately equal emphasis on production and conservation considerations. A basic thesis of the project is that Bolivian tropical forests will not be conserved unless their value is more broadly appreciated. Lack of reliable data on the value of sustained yield vs. immediate use and conversion limits the impact of conservation education to theoretical matters. This project is designed to supply that information, while it generates management regimes which will permit sustainable use.

The project does not deal with conversion of commercial agriculture and pasture and unrestrained colonization. These are being approached through land use planning with World Bank and other donor support, while BOLFOR focuses on sustainable NFM.

The economic incentive to continue the highgrade extraction of mahogany is powerful, and without viable alternatives, may end in a decade as economically extractable trees are eliminated. With no further interest in rejecting invasion, concessionaires will allow colonization or clear the land for pasture. Three interrelated alternatives can help avoid this: (1) The adoption of low cost sustainable NFM management practices will yield a continuous return and enable the *madereros* to continue to receive a return on their sunk investment. (2) Domestic legal constraints and the loss of markets with pressures for "green certification" are expected to reduce the economic incentive for destructive logging practices. (3) Value-added processing of wood products will enable *madereros* to utilize lower value species, and this will increase timber returns and help defray costs of improved NFM practices.

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3. Social Considerations

The socio-cultural context for forestry activities in Bolivia is highly conflictive, aggravated by overlapping "legal" tenure situations authorized by various agencies. Long neglected reform of the laws and institutions of land/natural resources allocation and administration have contributed to creating a situation that will take years to put in order. It is not uncommon to find land which has been customarily owned and used by indigenous peoples for centuries over which there are two land titles granted to different individuals by different government agencies, a forest concession, and a mining concession. All of these "rights" over the land are perfectly legal under a variety of laws that deal separately with land tenure, colonization, forest concessions, mining concessions, and indigenous communal territories. In this kind of legal environment, conflict resolution in not so much a question of right or wrong, but of the power to use the system in one's favor. The project cannot address directly these tenure problems, with their complex legal, political, and institutional aspects. However, studies undertaken by the Policy and Institutional Analysis component will provide decision makers with a clearer picture of the situation and its underlying causes and solutions.

In the next five to ten years, these competing claims over the resources of the region will sort themselves out through the national political system. If the current ten year democratic political system persists, the resolution of actual and potential conflicts may be resolved fairly. The focus on the lowland's resources and their uncertain future has contributed to an unprecedented effort by the Bolivian government to modernize and upgrade its legal and institutional capacity to protect the environment, and to deal with the increasing demands on the natural resources of country and of the lowlands in particular. Part of the reforms underway include the recognition and protection of indigenous peoples rights to their traditionally held territories and their resources.

As noted above, the changes in environmental legislation and institutional roles and responsibilities are only beginning to be implemented. They have a long way to go before significant and noticeable changes take place in the actual use and management of the natural resources of the country, and especially the resources of the lowlands region. Fortunately, those changes seem to be in the making. There seems to be consensus among the main political parties on the need to move ahead with the comprehensive overhaul of the laws and institutions that govern the country. This includes modifications in the constitution of the country, decentralization of central government functions, and some devolution of power to the regions.

The project seeks to accent the positive aspects of this inherently difficult situation. Therefore, it intends to work even-handedly with concessions operated by the commercial forest industry and by indigenous peoples, and will attempt to develop NFM systems of equal value to both groups, and to the forest. To the extent that NFM makes forestry more economically sustainable, local residents and enclave workers alike will have a continuing stream of benefits. Sustainability can also be encouraged by performing the R&D work

needed to stimulate the sustainable use of additional products from the forest, including lesser used species of wood, processed wood products, and non-timber forest products.

The project has been designed to build on the knowledge and capacities of local forest residents in and around the natural forest management field sites. A rural sociologist/social anthropologist is a permanent member of the field team. S/he will be responsible for developing arrangements to collect local knowledge through direct contact as well as such techniques as village-administered surveys. A short-term anthropologist skilled in rapid appraisal techniques will perform a periodic appraisal to ensure that project activities are responsive to local needs. This survey will also seek to identify additional means of encouraging the input of indigenous people and other local residents in the design and conduct of research and development of alternative products, and on the impacts of different harvesting strategies on local ecosystem dynamics.

The design team recognized the desirability of closer collaboration among industry, the GOB, environmental and indigenous organizations, and other key forestry stakeholders to work towards a common goal. This challenge guided the team's dialogue with representatives of each group, and its determination to facilitate collaborative interchange during project implementation.

4. New Sector Emphasis and the GOB Commitment

Throughout the design, the team sought to establish an appreciation of the importance given by the GOB to environmental issues, and to forestry in particular. The design team has worked closely at the national level with representatives of FONAMA, SENMA, and MACA, and at the departmental level with MACA/CDF-SC, universities, and others.

One must distinguish between GOB commitment and capacity. The GOB has taken some strong initiatives, ranging from the Pausa Ecológica Histórica to the creation of FONAMA and SENMA (and, more recently, the MDSMA), to the passage of a General Law on the Environment. However, it was not able to prepare an appropriate new Forestry Law and secure its passage, nor fulfill its commitment to decentralization. It is not unreasonable to state that it will continue to find institutional reform difficult, and will not be able to enforce all the provisions of the Pausa. It is difficult to see how all concessions can operate under sustainable management plans by 1995, when basic ecological knowledge is still lacking. The PID is correct in stating that "the growth and development of [environmental] capacity ...will require serious effort and commitment..."

However, the serious interest in collaboration shown by all groups and institutions is highly encouraging, and an indication that a will to change exists. Recognition of the serious nature of the problem is widespread, and this recognition is driving the interest in collaboration.

BOLFOR should certainly strengthen the GOB's ability to fulfill commitments. The training program will provide people capable of doing the work of conservation, while the

research program defines the limits and means of sustainability and the product development component demonstrates economic feasibility. The economic and institutional work will help both the executive and legislative authorities to arrive at appropriate decisions, and inform GOB policy formulation.

5. Institutional Considerations

The design team spent considerable effort learning about the capacity and interests of various institutions with a view to counterpart relationships. Like the PID, the design team found that capability was a function of age, of leadership, of past mishaps and good fortune. In particular, at this time the new agencies (i.e., SENMA) had not yet developed departmental capabilities, while the older line agencies (e.g., CORDECRUZ, CDF) were under the sentence of still-undefined reorganization.

The design team decided on a pragmatic solution. First, FONAMA, which has mandate to manage programs and projects in the environmental and natural resource areas, was originally selected as the national umbrella counterpart for BOLFOR, although BOLFOR was to look to SENMA as a counterpart for both the Economic Policy and Institutional Analysis Component and for environmental monitoring and evaluation activities. However, the new institutional context (with creation of the MDSMA) now combines the functions and attributes of SENMA and FONAMA and the sustainable forestry production activities previously assigned to MACA. This will greatly simplify institutional arrangements and coordination, and should facilitate achievement of project goals and objectives. No clear counterpart choice has yet emerged for Product Development. The team will define its program and work through separate agreements with the various public and private institutions which comprise this program area, seeking to build and use their different capacities.

B. DESIGN FACTOR ISSUES AND CONCERNS

The following design factors are issues which have arisen during PP development. In general, they require intervention beyond the scope of the project, depend on information which was not available, or will require deeper study during implementation.

1. Site Selection

After careful consideration of alternative sites, the design team decided on Bajo Paraguá, with potential satellites for other limited activities. Virtually all forest areas in Santa Cruz have been the subject of some disturbance, but any large area, e.g., Bajo Paraguá, includes enough variety to permit study of essentially virgin as well as severely disturbed forest. However, even such a diverse area fails to provide access to all conditions, or take advantage of research in progress; hence the need for satellite areas. Another factor which influenced our decision was the issue of phasing. This project will start small and develop capacity based on research and monitoring. The TA team will concentrate on the

single area of Bajo Paraguá and a research satellite in Chimanes for the first years of the program, then expand the work to a second major area, probably the Alto Madidi.

2. Core versus Conditional Activities and Phasing

The project is designed to focus on the most important (core) activities in the project's early years; this encompasses Phases I and II of the project through year four. Phase III (years 5, 6 and 7) activities will be undertaken only after USAID and the GOB are satisfied that the work that has been conducted in the first two phases should be continued or is relevant and appropriate to achieving project objectives, for example: 1) research that should be continued because of the need for additional information for sustainable management and certification; 2) application of adaptive research and forest management techniques and technologies which have been studied on pilot plots to broader areas in Bolivia; 3) investigation of the sustainability of harvesting new non-timber products; and 4) economic studies/analyses to assess the impacts of new policies, laws or regulations.

The phasing of the project is discussed in the section containing the project description, as well as in the section containing the management and implementation plan.

3. Working with the Forest Industry

Discussions with the CNF and individual concessionaires surfaced a number of issues with regard to collaboration with the industry. Most important of these is the weakness of information on NFM methodologies which can prove that they are both economically and ecologically sustainable. While the design team is confident that the methodologies which it proposes to test will prove far superior to current practices, they have not been tested under Bolivian conditions. The environmental assessment requires that the TA team determine environmental impact prior to encouraging adoption. The TA team will work with individual concessionaires who provide adequate safeguards to establish trials, but cannot extend this to the industry until satisfactory results have been achieved. It is estimated that it will be three to four years before we can satisfy these conditions. During this time, the TA team will provide information to the CNF which will enable it to activate its technical unit and extend information on NFM planning to its membership.

4. Database Acquisition

During the design phase, several databases were identified which BOLFOR should evaluate and acquire to help establish a broad environmental baseline, and to help plan subsequent efforts. Two of these databases, one developed by German TA in CORDECRUZ, the other by Dutch TA working in La Paz, Pando and Beni, are particularly comprehensive, with both satellite imagery and data from a variety of commissioned studies. It is expected that by the time BOLFOR starts implementation work on these data bases would have been completed, their final report delivered to the GOB, and access to them clearly defined. This will allow the team to evaluate them for use in BOLFOR activities.

Design team conversations with the German technicians and CORDECRUZ were cordial and helpful, thus, access to the databases, if not outright acquisition, is not expected to pose a constraint. It should be noted that the preparation of the land use maps was undertaken as a condition of World Bank lending, so broader use of the database should not be a problem.

5. Certification and Enforcement

The economics of Bolivian hardwood exploitation continue to bother us. As mentioned above (A.2), there are good reasons to believe that the availability of sustainable NRM practices will encourage some (if not most) of the concessionaires to adopt a longer term view of the forest resource. This is not certain, however, and can best be assured if sustainable management becomes an enforceable requirement, either by the market, or the GOB. At this point in time, despite the significant advances in GOB intent, national police-like enforcement is dubious. Pending business includes a new forestry law and institutional changes which may (or may not) be favorable, and may (or may not) lead to favorable enforcement.

However, green certification (i.e., assurances that lumber was produced under sustainable management), enforced by NGOs and lumber users in the industrialized countries, could become a very potent force, particularly if Bolivian producers were boycotted. This force is much more potent in Europe and, increasingly, in the U.S. than in other regions, and is still a couple of years away from implementation. In the meantime, BOLFOR's working assumption is that economical NFM (and the threat of certification requirements for access to export markets) will encourage concessionaires to do what they say they want to do: adopt sustained yield NFM practices. What is certain is that without such sustained yield NFM, the timber concessions will continue to be mined.

6. Conditioning Disbursement on Legislation

Several laws affecting forestry and the environment and the institutions which are responsible for their management are pending in the legislature. After an earlier, problemmatical forestry law failed to pass, some advocates became convinced that this effort was doomed to failure or the law would be corrupted in passage. They believe that future passage of a sound law is dependent on a consensus-building effort which could take as long as two or three years. Others would seek to condition this project on passage of legislation. The design team opposes such conditioning on several grounds: First, this project is largely directed at research and development, education, and training, with little financial leverage on those who are responsible for legislative action. Second, failure to conduct rapidly the information gathering intent of this project will just prevent accumulation of information essential to good policy making and implementation. Third, the quality of legislation and its regulation is far more important than simple passage of a bad or mediocre law, and quality is a characteristic which is impossible to specify as a condition or covenant.

7. Institutional Restructuring

The fate of the CDF is uncertain. CDF's restructuring awaits the new forestry law. At the same time, SENMA has not yet developed its regional SEDEMAs. Delays in restructuring, lack of a clear leader among multiple sector institutions, and the need to accommodate private industry and non-governmental institutions led us to the pragmatic choice of counterpart institutions summarized in A.5. above. BOLFOR will not provide institutional support to CDF/La Paz at the outset of the project. It will, however, work with and through CDF's staff in Santa Cruz. Technical staff will also receive training. This strategy is aimed at building human resource capacity. Should the organization be restructured and take on new or different responsibilities under a new forestry law, and therefore require institutional strengthening assistance, BOLFOR will reassess what might be done to support CDF/SC's needs.

8. Criteria for Working with Concessionaires

As indicated above (B3. Phasing), BOLFOR will not begin to work with the forest industry as a whole (whether large, medium, or small concessions, either privately or community owned) until the TA team is confident that recommended NFM methods are both ecologically and economically sustainable. However, the project team will carry out trials on selected areas where the concessionaire or community group agrees to collaborate. The criteria of such collaboration would include facility of access to the general area of the concession; participation in selection of appropriate sites; access to production and relevant financial data; protection of sampling plots during the LOP; in-kind participation in providing access or performing NFM practices; permitting staff to participate in training programs, etc. Development of these criteria will require additional consultation with a number of concessionaires in the area.

9. Land Tenure

The BOLFOR project cannot deal effectively with a subject as broad and complex as land tenure, even though the design team recognizes land tenure conflicts as significant problems in forestry economics and sociology. The World Bank is working with the GOB on this important issue. BOLFOR will monitor progress on the topic and coordinate closely with the World Bank land tenure reform program.

ANNEX A

LOGICAL FRAMEWORK			
GOAL	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
To reduce degradation of forest, soil, and water resources and protect biodiversity	1. Deforestation, soil, and water erosion reduced in areas of project intervention. 2. Key species vital for ecosystem functioning defined and protected through GOB monitoring (MDS and environmental NGOs), sustainable forest plans and practices (certification), and widespread forestry sector awareness of the importance of protecting biodiversity.	1. Project data collection: M&E system. 2. M&E system, independent evaluations.	GOB policies do not discourage long-term investment in forest management. No catastrophic natural disasters.

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LOGICAL FRAMEWORK			
PURPOSE	**EOPS**	**VERIFICATION**	**ASSUMPTIONS**
To build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use.	<u>Policy and institutional reforms</u>:		
	1. Suitable forestry law and/or regulations drafted with project technical assistance, presented to GOB by MDSMA by 1996.	1. Public records, asessments and evaluations by appropriate organizations.	Enacting new forestry law remains a high priority for GOB.
	2. GOB institutions capable of continuing BOLFOR-initiated sustainable forestry activities. MDSMA has regional capacity in Santa Cruz; CDF/SC (or replacement) performing effective forest research and extension roles.	2. Public records, formal institutional assessments and evaluations, and interviews with knowledgeable persons in public and private sectors dealing with forestry.	Restructuring plans are in fact carried out. MDSMA carries out its plans to open offices at departmental level, and these are provided with sufficient resources to work with.
	3. An internationally recognized mechanism is established and functioning, certifying the sustainable production of timber and non-timber forest products.	3. Public records, organization chart and files, interviews with knowledgeable persons, evaluations and assessment by diverse national and international institutions.	Public and Private sectors willing to work towards this objective and commit the resources needed. GOB enacts and implements legislation needed. Market for sustainably produced forest products -especially tropical hardwoods-develops as expected.
	<u>Forest management practices</u>:		
	1. A substantial body of research undertaken and published on tropical flora and fauna, ecology, product development/utilization, and indigenous technologies, including methodologies for determining sustainability to allow for certification.	1. Reports, articles in journals, and project files.	Effective arrangements for research/demonstration plots established with concessionaires and national and international research/training entities.
	2. Forest management practices tested, evaluated and adopted by commercial foresters and community groups in different ecological settings.	2. Project related and/or independent evaluations of forestry operations in the country.	Combined study data shows that NFM are both economically and ecological sustainable.

LOGICAL FRAMEWORK			
PURPOSE	**EOPS**	**VERIFICATION**	**ASSUMPTIONS**
	3. New markets developed for certified timber and non-timber forest products.	3. Records of assisted enterprises. National export statistics, Trade statistics.	Records are made available for review.
	4. 25 percent of all hectares in forest production in Santa Cruz certified as being managed sustainably.	4. CDF and CNF statistics, verified by certification entity data.	Certification of forest products will become a significant factor in world markets, and GOB legislation requiring sustainable forest management is in place and being enforced by 1996.
	Human resource development:		
	1. A cadre of Bolivian professionals and technicians (foresters, forest ecologists, wildlife specialists, natural resource economists, biologists, etc.) capable of undertaking further work in BOLFOR initiated activities, working in the certification entity, forest industry, GOB, and Bolivian universities.	1. Long-term and other training of 12 Bolivians (M.S. or Ph.D.) capable of designing and implementing sustainable forestry plans. One international conference on Natural Forest Management. At least 100 person trained in specific aspects of sustainable forest management.	Demand for training remains high.

LOGICAL FRAMEWORK			
A. Policy Analysis and Institutional Development Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
1. Forestry law and/or regulations	1. At least two public seminars held to discuss a new forestry law, bringing together representatives of both public and private sectors (both completed by September 1995).	1. Public records	Concern and interest in sustainable forestry remain high internationally. Concern and interest in sustainable forestry and conservation continues to grow in Bolivia.
	2. At least three state-of-the-art background papers prepared to inform on the development of the new forestry legislation, e.g. economics, policy, institutional aspects of sustainable forest management (one in 1994, one in 1995 and one in first half of 1996).	2. Publications/public records.	Demand for training and advancement in the forestry field remains high and employment prospects in the field materialize.
	3. Draft forest law and/or regulations presented by 1996.	3. Public record	Political will in executive and legislative bodies remain high. Popular concern with conservation remains high.
2. Sustainable Forestry Certification	1. Internationally recognized certification mechanism in place able to service both project-assisted and other forest producer groups (June 1996).	1. Public record and Organization charter and other files. Expression of recognition by international bodies.	Public and private sector agree to work together and make resources available to support such a mechanism.
	2. Four or more project-assisted forest products (timber or non-timber) certified through this mechanism (2 in 1995, 2 in 1996).	2. Records in the organization, the enterprises served and/or the trade association and/or GOB statistics.	Markets do in fact develop for these products as expected.

LOGICAL FRAMEWORK			
A. Policy Analysis and Institutional Development Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
3. Strengthened Institutions	1. CDFs (or replacements) in areas of major primary project intervention have technical capacity necessary to advise on, and review, and approve sustainable forest management plans, as per nationally approved standards. Two plans reviewed and approved by CDF (1998). 2. SEDEMAs (or replacements) in areas of major project intervention have technical capacity necessary to monitor compliance with sustainable forestry management plans and certification guidelines based on nationally approved standards, with 4 forest concessions effectively monitored (e.g. certification of forest products maintained and/or concessions renewed or canceled based on environmental management) (1998).	1. Project and/or external evaluation or institutional analysis. 2. CDF records and interested/affected organizations assessment.	Implementation of reforms by GOB. The public continues to demand integrity and accountability from public sector agencies. GOB implements present plans for creation of SEDEMAS including allocation of resources necessary to carry out mission.
4. Research	1. At least 4 technical articles published in referenced professional journals, with at least 2 of these authored or coauthored by Bolivian scientists (2 by 1996, 2 by 1999).	1. Professional journals	Graduate students and professionals interested and capable in undertaking research and analysis in sustainable forestry and related fields.

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LOGICAL FRAMEWORK			
A. Policy Analysis and Institutional Development Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
5. Training	1. At least 50 persons trained through in-country seminars in forestry legislation and certification issues (including at least half from the private sector) (25 by 1995, 25 by 1998).	1. Project and public records.	Interest in topics remain high among diverse member of forestry/conservation fields.
	2. At least 3 masters degrees received under BOLFOR sponsored research (by 1998).	2. Project records	Qualified Bolivians apply for grants/fellowships.
	3. At least 2 masters or PhD degrees received through long-term training.		Qualified Bolivians apply for grants/fellowships.

LOGICAL FRAMEWORK			
B. Natural Forest Management Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
1. Sustainable Forest Management Practices	1. New forestry practices developed and tested in at least 4 different ecological settings, with their economic and ecological performance compared to existing commercial practices (2 by 1995, 2 by 1997).	1. Project records, forest enterprise records, assessments, evaluations, and questionnaires.	No natural disasters. Effective arrangement for research/demonstrations plots and maintenance. Forest concessionaires remain interested in collaborating with project.
	2. Two comprehensive project sites established and functioning (one by 1994, one by 1996).	2. Site visits and project record.	Project has successfully demonstrated economic and ecological viability of sustainable forestry.
	3. Four or more plans for sustainable forest use (including production or timber and/or non-timber forest products) developed, approved and being implemented (2 by 1995, 2 by 1997).	3. Records/files in Project Office, CDF, and the interested producer. Interviews with producer/buyers.	Markets for sustainably produced forest products develop as expected/predicted. GOB enacts and implements all legislation needed to encourage/require sustainable use of forest.
	4. At least 4 concessionaires and/or community groups using BOLFOR project recommendations (by 1999).	4. Project records/files. Site visits and interviews.	This assumes that certification of forest products will become a significant factor in world markets, and that GOB legislation requiring sustainable forest management is in place and being enforced by 1996. Concessionaire and community groups remain interested.

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LOGICAL FRAMEWORK			
B. Natural Forest Management Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
2. Research	1. At least 8 articles published in professional journals, with at least 4 of these authored or coauthored by Bolivian scientists (2 by 1995, 4 by 1998 and 2 by 1999).	1. Professional journals.	Interest in sustainable forestry research remains high among graduates and university students in forestry and related fields..
	2. State of the art manual on sustainable forest management techniques prepared and disseminated, in both Spanish and English (by 1997)	2. Project publications.	Research is successfully completed and interest in results remains.
	3. Companion state of the art manual on techniques for assessing impacts of forest products harvesting on biological diversity (flora and fauna) prepared and disseminated, in both Spanish and English. (Note: both 2 and 3 can be combined in one manual).	3. Project publications.	Research completed successfully and interest remains.

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LOGICAL FRAMEWORK			
B. Natural Forest Management Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
3. Training (Human Resource Development)	1. Through long-term and other training, a professional cadre of at least 10 Bolivians (MS or PhD levels) capable of designing and implementing plans for sustainable forestry management (including know how to comply with all requirements for product certification), are available to the local forest industry, the GOB and Bolivian universities (5 by 1997 and 5 by 1999).	1. Project records	Interest by qualified students and graduates remains high and job opportunities develop as expected.
	2. At least one BOLFOR sponsored international conferences held in Bolivia on natural forest management, with BOLFOR staff making at least three keynote presentation, and with other AID assisted countries invited to participate (1997).	2. Public and project records.	Interest in sustainable forestry remains high.
	3. At least 100 persons trained (BS, associate or field personnel level) in specific aspects of sustainable forest management, including low-impact methods of forest product harvesting, techniques for inventories of biological diversity and other relevant topics, in-country seminars (25 by 1995, 50 by 1997 and 25 by 1999).	3. Project records.	

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LOGICAL FRAMEWORK			
C. Product Development Component			
OUTPUTS	**INDICATORS**	**VERIFICATION**	**ASSUMPTIONS**
1. Timber products	1. Successful marketing of at least two certifiable forest products and/or two value added products from two species currently being marketed, with total dollar volume of sales at least $2 million by 1998.	1. Project and enterprises records and files. GOB statistics.	Markets for certifiable forest products develop as expected/predicted.
	2. Marketing of two additional certifiable forest products from two additional species, with total dollar volume of sales of at least $.5 million by 1999.	2. Project and enterprises records and files. GOB statistics.	Markets for certifiable forest products develop as expected/predicted.
2. Non-timber products	1. Successful marketing of at least two certifiable forest products and/or two value added products from two species currently being marketed, with total dollar volume of sales at least $.5 million by 1997.	1. Project and enterprises records and files. GOB statistics.	Markets for certifiable forest products develop as expected/predicted.
	2. Marketing of two additional certifiable forest products from two additional species by 1999.	2. Project and enterprises records and files. GOB statistics.	Markets for certifiable forest products develop as expected/predicted.
3. Research	1. Result in knowledge of the types of and techniques for sustainable production and marketing of timber and non-timber products.	1. Written reports and project bulletins..	Non-timber products offer attractive forest use alternatives
4. Training	1. At least 24 persons trained in forest product development in-country seminars, with at least half from the private sector (12 by 1997 and 12 by 1999).	1. Project training records and interviews with trainees	Economic and ecological viability of producing non-timber forest products demonstrated to interested entrepreneurs.

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ANNEX B
STATUTORY CHECKLIST

SUSTAINABLE FORESTRY MANAGEMENT PROJECT
PROJECT 511-0621

5C(2) - ASSISTANCE CHECKLIST

Listed below are statutory criteria applicable to the assistance resources themselves, rather than to the eligibility of a country to receive assistance. This section is divided into three parts. Part A includes criteria applicable to both Development Assistance and Economic Support Fund resources. Part B includes criteria applicable only to Development Assistance resources. Part C includes criteria applicable only to Economic Support Funds.

CROSS REFERENCE: IS COUNTRY CHECKLIST UP TO DATE?	Yes, the Country Checklist was submitted with PAAD for FY93 Economic Recovery Program (BOP).
A. CRITERIA APPLICABLE TO BOTH DEVELOPMENT ASSISTANCE AND ECONOMIC SUPPORT FUNDS	
1. Host Country Development Efforts (FAA Sec. 601(a)): Information and conclusions on whether assistance will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.	This is a forestry project. (a) Yes (b) Yes (c) No (d) Yes (e) Yes (f) No
2. U.S. Private Trade and Investment (FAA Sec. 601(b)): Information and conclusions on how assistance will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	A U.S. contractor will provide technical assistance and training.
3. Congressional Notification	
a. General requirement (FY 1993 Appropriations Act Sec. 522; FAA Sec. 634A):' If money is to be obligated for an activity not previously justified to congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified (unless the Appropriations Act notification requirement has been waived because of substantial risk to human health or welfare)?	Congress will be fully notified before obligation.
b. Notice of new account obligation (FY 1993 Appropriations Act Sec. 514): If funds are being obligated under an appropriation account to which	N/A. These are earmarked (Environment and Natural Resources) DA funds.

	they were not appropriated, has the President consulted with and provided a written justification to the House and Senate Appropriations Committees and has such obligation been subject to regular notification procedures?	
	c. Cash transfers and nonproject sector assistance (FY 1993 Appropriations Act Sec. 571(b)(3)): If funds are to be made available in the form of cash transfer or nonproject sector assistance, has the Congressional notice included a detailed description of how the funds will be used, with a discussion of U.S. interests to be served and a description of any economic policy reforms to be promoted?	N/A
4.	Engineering and Financial Plans (FAA Sec. 611(a)): Prior to an obligation in excess of $500,000, will there be: (a) engineering, financial or other plans necessary to carry out the assistance; and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	(a) Yes (b) Yes
5.	Legislative Action (FAA Sec. 611(a)(2)): If legislative action is required within recipient country with respect to an obligation in excess of $500,000, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance?	Not required
6.	Water Resources (FAA Sec. 611(b); FY 1993 Appropriations Act Sec. 501): If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et sea.)? (See A.I.D. Handbook 3 for guidelines.)	N/A
7.	Cash Transfer and Sector Assistance (FY 1993 Appropriations Act Sec. 571(b)): Will cash transfer or nonproject sector assistance be maintained in a separate account and not commingled with other funds (unless such requirements are waived by Congressional notice for nonproject sector assistance)?	N/A. This is a DA funded forestry project.
8.	Capital Assistance (FAA Sec. 611(e)): If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's	N/A

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capability to maintain and utilize the project effectively?

9. Multiple Country Objectives (FAA Sec, 601(a)): Information and conclusions on whether projects will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

See No. A.1. above

10. U.S. Private Trade (FAA Sec. 601(b): Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

See No. A.2. above

11. Local Currencies

a. Recipient Contributions

(FAA Secs. 612(b), 636(h)): Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

The host country is contributing 25% to the total project cost.

b. U.S.-Owned Currency (FAA Sec. 612(d)): Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

No

c. Separate Account (FY 1993 Appropriations Act Sec. 571). If assistance is furnished to a foreign government under arrangements which result in the generation of local currencies:

(1) Has A.I.D. (a) required that local currencies be deposited in a separate account established by the recipient government, (b) entered into an agreement with that government providing the amount of local currencies to be generated and the terms and conditions under which the currencies so deposited may be utilized, and (c) established by agreement the responsibilities of A.I.D. and that government to monitor and account for deposits into

N/A. These matters are covered by the annual ESF Program Grant Agreements.

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and disbursements from the separate account?

(2) Will such local currencies, or an equivalent amount of local currencies, be used only to carry out the purposes of the DA or ESF chapters of the FAA (depending on which chapter is the source of the assistance) or for the administrative requirements of the United States Government?	Yes
(3) Has A.I.D. taken all appropriate steps to ensure that the equivalent of local currencies disbursed from the separate account are used for the agreed purposes?	Yes
(4) If assistance is terminated to a country, will any unencumbered balances of funds remaining in a separate account be disposed of for purposes agreed to by the recipient government and the United States Government?	Yes
12. Trade Restrictions	
a. Surplus Commodities (FY 1993 Appropriations Act Sec. 520(a)): If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?	No
b. Textiles (Lautenberg Amendment) (FY 1993 Appropriations Act Sec. 520(c)): Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel?	No
13. Tropical Forests (FY 1991 Appropriations Act Sec. 533(c)(3)(as referenced in section 532(d) of the FY 1993 Appropriations Act): Will funds be used for any program, project or activity which would (a)	(a) No, on the contrary this project focuses on the sustainable management of forests.

result in any significant loss of tropical forests, or (b) involve industrial timber extraction in primary tropical forest areas?	(b) The project's research, technical assistance, and training will take place in areas that have already been logged by the private sector. In addition, extraction of certified timber products will be done in a sustainable fashion, and by increasing the value of the forest should result in reduced deforestation. Impacts of selective logging on biological diversity (flora and fauna) will be very carefully monitored, and the project aims at developing low-impact methods of forest product havesting to reduce substantially the currently severe impacts of forestry on biological diversity. As per the terms of the Environmental Assessment, no forest product harvesting will be undertaken, promoted, or recommended unless a careful, product-specific EA has been carried out and approved.
14. PVO Assistance	
a. Auditing and registration (FY 1993 Appropriations Act Sec. 536): If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.?	Yes
b. Funding sources (FY 1993 Appropriations Act, Title II, under heading "Private and Voluntary OrganizationS'): If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of total annual funding for international activities from sources other than the United States Government?	Yes
15. Project Agreement Documentation (State Authorization Sec. 139 (as interpreted by conference report)): Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision)	USAID/Bolivia will comply with these requirements, as made applicable by HB3, after signing the Project Grant Agreement.

16. Metric System (Omnibus Trade and Competitiveness Act of 1988 Sec. 5164, as interpreted by conference report, amending Metric Conversion Act of 1975 Sec. 2, and as implemented through A.I.D. policy): Does the assistance activity use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate? Will A.I.D. specifications use metric units of measure from the earliest programmatic stages, and from the earliest documentation of the assistance processes (for example, project papers) involving quantifiable measurements (length, area, volume, capacity, mass and weight), through the implementation stage?

N/A. The commodities to be procured are vehicles, office and other equipment.

17. Women in Development (FY 1993 Appropriations Act, Title II, under heading "Women in Development"): Will assistance be designed so that the percentage of women participants will be demonstrably increased?

Women university students in various forestry related specialties will (through BOLFOR research and training programs) find training and employment in fields traditionally occupied by males, such as forest engineering and/or find employment in new fields, such as biology, ecology, and botany needed to design, implement and evaluate sustainable forestry programs. In the case of populations that derive part or all of their income from the forest the roles of women are not yet clearly defined. Once the Project has identified these current roles, ways will be sought to increase women's participation. A gender specialist was included in the project design effort, as per USAID/Bolivia requirements.

18. Regional and Multilateral Assistance (FAA Sec. 209): Is assistance more efficiently and effectively provided through regional or multilateral organizations? If so, why is assistance not so provided? Information and conclusions on whether assistance will encourage developing countries to cooperate in regional development programs.

No. A consortium of organizations (both Bolivian and U.S.) led by Chemonics, a U.S. consulting firm, will be implementing the project. This approach draws on a number of different specialties required by the project's complexity, and regional and

	multilateral organizations do not have the expertise to implement this project, and do not intend to fund similar efforts (however, they endorse USAID's proposal, and have been been fully advised).
19. Abortions (FY 1993 Appropriations Act, Title II, under heading "Population, DA," and Sec. 524):	
a. Will assistance be made available to any organization or program which, as determined by the President, supports or participates in the management of a program of coercive abortion or involuntary sterilization?	No
b. Will any funds be used to lobby for abortion?	No
20. Cooperatives (FAA Sec. 111): Will assistance help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life?	No
21. U.S.-Owned Foreign Currencies	
a. Use of currencies (FAA Secs. 612(b), 636(h); FY 1993 Appropriations Act Secs. 507, 509): Are steps being taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. are utilized in lieu of dollars to meet the cost of contractual and other services.	The FY 93 ESF Program Grant Agreement will reserve approximately $4 million worth of local currency for the administrative and operational needs of USAID.
b. Release of currencies (FAA Sec. 612(d)): Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	No
22. Procurement	
a. Small business (FAA Sec. 602(a)): Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?	Yes
b. U.S. procurement (FAA Sec. 604(a) as amended by section 597 of the FY 1993 Appropriations Act): Will all procurement be from the U.S., the recipient country, or developing countries	Yes

except as otherwise determined in accordance with the criteria of this section?

c. Marine insurance (FAA Sec. 604(d)): If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company?

Yes

d. Non-U.S. agricultural procurement (FAA Sec. 604(e)): If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.)

N/A. No agricultural procurement is planned for the project.

e. Construction or engineering services (FAA Sec. 604(g)): Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.)

N/A. No construction or engineering services will be procured under the project.

f. Cargo preference shipping (FAA Sec. 603)): Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates?

No

g. Technical Assistance

(FAA Sec. 621(a)): If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, with private enterprise, and made available without undue interference with

Yes, Yes

domestic programs?

h. U.S. air carriers (International Air Transportation Fair Competitive Practices Act, 1974): If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? Yes

i. Termination for convenience of U.S. Government (FY 1993 Appropriations Act Sec. 504): If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? Yes

j. Consulting services (FY 1993 Appropriations Act Sec. 523): If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)? Yes

k. Metric conversion (Omnibus Trade and Competitiveness Act of 1988, as interpreted by conference report, amending Metric Conversion Act of 1975 Sec. 2, and as implemented through A.I.D. policy): Does the assistance program use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate? Yes

Will A.I.D. specifications use metric units of measure from the earliest programmatic stages, and from the earliest documentation of the assistance processes (for example, project papers) involving quantifiable measurements (length, area, volume, capacity, mass and weight), through the implementation stage? Yes

Yes

l. Competitive Selection Procedures (FAA Sec. 601(e)): Will the assistance utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes

23. Construction

a. Capital project (FAA Sec. 601(d)): If capital (e.g., construction) project, will U.S. engineering and professional services be used?	N/A
b. Construction contract (FAA Sec. 611(c)): If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	N/A
c. Large projects, Congressional approval (FAA Sec. 620(k)): If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million (except for productive enterprises in Egypt that were described in the Congressional Presentation), or does assistance have the express approval of Congress?	N/A
24. U.S. Audit Rights (FAA Sec. 301(d)): If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?	Yes
25. Communist Assistance (FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries?	Yes
26. Narcotics	
a. Cash reimbursements (FAA Sec. 483): Will arrangements preclude use of financing to make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated?	Yes
b. Assistance to narcotics traffickers (FAA Sec. 487): Will arrangements take "all reasonable steps" to preclude use of financing to or through individuals or entities which we know or have reason to believe have either: (1) been convicted of a violation of any law or regulation of the United States or a foreign country relating to narcotics (or other controlled substances); or (2) been an illicit trafficker in, or otherwise involved in the illicit trafficking of, any such controlled substance?	Yes, USAID/Bolivia has designed and is implementing a screening system under Sec. 487.

27. Expropriation and Land Reform (FAA Sec. 620(g)): Will assistance preclude use of financing to compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President?	Yes
28. Police and Prisons (FAA Sec. 660): Will assistance preclude use of financing to provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs?	Yes
29. CIA Activities (FAA Sec. 662): Will assistance preclude use of financing for CIA activities?	Yes
30. Motor Vehicles (FAA Sec.636 (i)) : Will assistance preclude use of financing for purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained?	Yes
31. Military Personnel (FY 1993 Appropriations Act Sec. 503): Will assistance preclude use of financing to pay pensions, annuities, retirement pay, or adjusted service compensation for prior or current military personnel?	Yes
32. Payment of U.N. Assessments (FY 1993 Appropriations Act Sec. 505): Will assistance preclude use of financing to pay U.N. assessments, arrearage or dues?	Yes
33. Multilateral Organization Lending (FY 1993 Appropriations Act Sec. 506): Will assistance Preclude use of financing to carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)?	Yes
34. Export of Nuclear Resources (FY 1993 Appropriations Act Sec. 510): Will assistance preclude use of financing to finance the export of nuclear equipment, fuel, or technology?	Yes
35. Repression of Population (FY 1993 Appropriations Act Sec. 511): Will assistance preclude use of financing for the purpose of aiding	Yes

the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?

36. Publicity or Propaganda (FY 1993 Appropriations Act Sec. 516): Will assistance be used for publicity or propaganda purposes designed to support or defeat legislation pending before congress, to influence in any way the outcome of a political election in the United States, or for any publicity or propaganda purposes not authorized by congress? — No

37. Marine Insurance (FY 1993 Appropriations Act Sec. 560): Will any A.I.D. contract and solicitation, and subcontract entered into under such contract, include a clause requiring that U.S. marine insurance companies have a fair opportunity to bid for marine insurance when such insurance is necessary or appropriate? — Yes

38. Exchange for Prohibited Act (FY 1993 Appropriations Act Sec. 565): Will any assistance be provided to any foreign government (including any instrumentality or agency thereof), foreign person, or United States person in exchange for that foreign government or person undertaking any action which is, if carried out by the United States Government, a United States official or employee, expressly prohibited by a provision of United States law? — No

39. Commitment of Funds (FAA Sec. 635(h)): Does a contract or agreement entail a commitment for the expenditure of funds during a period in excess of 5 years from the date of the contract or agreement? — No

40. Impact on U.S. Jobs (FY 1993 Appropriations Act, Sec. 599):

(a) Will any financial incentive be provided to a business located in the U.S. for the purpose of inducing that business to relocate outside the U.S. in a manner that would likely reduce the number of U.S. employees of that business? — No

(b) Will assistance be provided for the purpose of establishing or developing an export processing zone or designated area in which the country's tax, tariff, labor, environment, and safety — No

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laws do not apply? If so, has the President determined and certified that such assistance is not likely to cause a loss of jobs within the U.S.

(c) Will assistance be provided for a project or activity that contributes to the violation of internationally recognized workers rights, as defined in section 502(a)(4) of the Trade Act of 1974, of workers in the recipient country? — No

I. CRITERIA APPLICABLE TO DEVELOPMENT ASSISTANCE ONLY

1. Agricultural Exports (Bumpers Amendment) (FY 1993 Appropriations Act Sec. 521(b), as interpreted by conference report for original enactment): If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities: (1) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (2) in support of research that is intended primarily to benefit U.S. producers? — N/A

2. Tied Aid Credits (FY 1993 Appropriations Act, Title II, under heading "Economic Support Fund"): Will DA funds be used for tied aid credits? — No

3. Appropriate Technology (FAA Sec. 107): Is special emphasis placed on use of appropriate technology (defined as relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)? — No

4. Indigenous Needs and Resources (FAA Sec. 281(b)): Describe extent to which the activity recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project will initiate an effort to retrieve and preserve indigenous peoples' forest technologies as a means of identifying new forest products with commercial potential. The project will develop the capability of Bolivians responsible for the protection and sustainable use of Bolivian forests, including community

	and indigenous groups, and to use this capability in managing and regulating the use of Bolivian forests.
5. Economic Development (FAA Sec. 101(a)): Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?	Yes
6. Special Development Emphases (FAA Secs. 102(b), 113, 281(a)): Describe extent to which activity will: (a) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (b) encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries.	(a) Project activities will have a significant positive impact on poor rural communities and indigenous peoples through a series of programs aimed at valuing their technologies, identifying non-timber forest products with commercial potential, and at incorporating them into a community-based research, product development, and monitoring network to assess and document the impacts of human activities on their environments. The technical assistance consortium will be headed by a U.S firm. (b) The project will support the institutional development of the local (Santa Cruz) Center for Forest Development, a government institution, and will also support NGOs and community groups. (c) The project purpose is essentially to develop a cadre of Bolivian professionals capable of all aspects of sustainable, certifiable forestry management. (d) Women will be integrated into project activities at the community level, and women professionals will result from the training and research supporting elements. Gender was an important consideration in project design. (e) The project will support south-south technical exchanges on issues of tropical/sub-tropical forest management, and will support regional cooperation for sustainable forest use and protection of biological diversity.

7. Recipient Country contribution (FAA Secs. 110, 124(d)): Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?	See No. A.11.a. above.
8. Benefit to Poor Majority (FAA Sec. 128(b)): If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?	Yes, one of the beneficiary groups will be rural poor communities and indigenous groups.
9. Abortions (FAA Sec. 104(); FY 1993 Appropriations Act, Title II, under heading "Population, DA," and Sec. 534):	
a. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions?	No
b. Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations?	No
c. Are any of the funds to be made available to any organization or program which, as determined by the President, supports or participates in the management of a program of coercive abortion or involuntary sterilization?	No
d. Will funds be made available only to voluntary family planning projects which offer, either directly or through referral to, or information about access to, a broad range of family planning methods and services?	N/A
e. In awarding grants for natural family planning, will any applicant be discriminated against because of such applicant's religious or conscientious commitment to offer only natural family planning?	N/A
f. Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions	No

or involuntary sterilization as a means of family planning?	
g. Are any of the funds to be made available to any organization if the President certifies that the use of these funds by such organization would violate any of the above provisions related to abortions and involuntary sterilization?	No
10. Contract Awards (FAA Sec. 601(e)): Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	Yes. This project is using the Design and Performance contracting process in which the same contractor selected for design may carry out the implementation. Consequently, full and open competition has already taken place in the selection of the design contractor.
11. Disadvantaged Enterprises (FY 1993 Appropriations Act Sec. 563): What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 40 percent of the students are Hispanic Americans, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?	Full and open competition has already taken place in the selection of the design contractor. HBCUs had the opportunity to bid at that time.
12. Biological Diversity (FAA Sec. 119(g): Will the assistance: (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas?	(a) Yes (b) Yes (c) Yes
13. Tropical Forests (FAA Sec. 118; FY 1991 Appropriations Act Sec. 533(c) as referenced in section 532(d) of the FY 1993 Appropriations Act):	
a. A.I.D. Regulation 16: Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16?	Yes

b. Conservation: Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (1) stress the importance of conserving and sustainably managing forest resources; (2) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (3) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (4) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (5) help conserve forests which have not yet been degraded by helping to increase production on lands already cleared or degraded; (6) conserve forested watersheds and rehabilitate those which have been deforested; (7) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (8) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (9) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (10) seek to increase the awareness of U.S. Government agencies and other donors of the immediate and long-term value of tropical forests; (11) utilize the resources and abilities of all relevant U.S. government agencies; (12) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land; and (13) take full account of the environmental impacts of the proposed activities on biological diversity?

(1) Yes; this is a key project objective.

(2) Yes

(3) Yes

(4) No, this not an agriculture project; however, by increasing the value of the forest the project will reduce deforestation and forest degradation.

(5) Yes

(6) Yes

(7) Yes

(8) Yes

(9) Yes

(10) Yes

(11) Yes

(12) Yes

(13) Yes

c. Forest degradation: Will assistance be used for: (1) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will

produce positive economic benefits and sustainable forest management systems; (2) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas; (3) activities which would result in the conversion of forest lands to the rearing of livestock; (4) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undergraded forest lands; (5) the colonization of forest lands; or (6) the construction of dams or other water control structures which flood relatively undergraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?	No, to all questions
d. Sustainable forestry: If assistance relates to tropical forests, will project assist countries in developing a systematic analysis of the appropriate use of their total tropical forest resources, with the goal of developing a national program for sustainable forestry?	Yes
e. Environmental impact statements: Will funds be made available in accordance with provisions of FAA Section 117(c) and applicable A.I.D. regulations requiring an environmental impact statement for activities significantly affecting the environment?	Yes
14. Energy (FY 1991 Appropriations Act Sec. 533(c) as referenced in section 532(d) of the FY 1993 Appropriations Act): If assistance relates to energy, will such assistance focus on: (a) end-use energy efficiency, least-cost energy planning, and renewable energy resources, and (b) the key countries where assistance would have the greatest impact on reducing emissions from greenhouse gases?	N/A
15. Debt-for-Nature Exchange (FAA Sec. 463): If project will finance a debt-for-nature exchange, describe how the exchange will support protection of: (a) the world's oceans and atmosphere, (b) animal and plant species, and (c) parks and reserves; or describe how the exchange will promote: (d) natural resource management, (e) local conservation programs, (f) conservation training programs, (g)	N/A

public commitment to conservation, (h) land and ecosystem management, and (i) regenerative approaches in farming, forestry, fishing, and watershed management.

16. Deobligation/Reobligation (FY 1993 Appropriations Act Sec. 515): If deob/reob authority is sought to be exercised in the provision of DA assistance, are the funds being obligated for the same general purpose, and for countries within the same region as originally obligated, and have the House and Senate Appropriations Committees been properly notified? N/A

17. Loans

a. Repayment capacity (FAA Sec. 122(b)): Information and conclusion on capacity of the country to repay the loan at a reasonable rate of interest. N/A

b. Long-range plans (FAA Sec. 122(b)): Does the activity give reasonable promise of assisting long-range plans and programs designed to develop economic resources and increase productive capacities? N/A

c. Interest rate (FAA Sec. 122(b)): If development loan is repayable in dollars, is interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter? N/A

d. Exports to United States (FAA Sec. 620(d)): If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20 percent of the enterprise's annual production during the life of the loan, or has the requirement to enter into such an agreement been waived by the President because of a national security interest? N/A

18. Development Objectives (FAA Secs. 102(a), 111, 113, 281(a)): Extent to which activity will: (1) effectively involve the poor in development, by expanding access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and

insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (2) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (3) support the self-help efforts of developing countries; (4) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (5) utilize and encourage regional cooperation by developing countries?	See No. B.6. above
19. Agriculture, Rural Development and Nutrition, and Agricultural Research (FAA Secs. 103 and 103A):	
a. Rural poor and small farmers: If assistance is being made available for agriculture, rural development or nutrition, describe extent to which activity is specifically designed to increase productivity and income of rural poor; or if assistance is being made available for agricultural research, has account been taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made.	N/A
b. Nutrition: Describe extent to which assistance is used in coordination with efforts carried out under FAA Section 104 (Population and Health) to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value; improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration programs explicitly addressing the problem of malnutrition of poor and vulnerable people.	N/A
c. Food security: Describe extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.	N/A

20. Population and Health (FAA Secs. 104(b) and (c)): If assistance is being made available for population or health activities, describe extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems, and other modes of community outreach.	N/A
21. Education and Human Resources Development (FAA Sec. 105): If assistance is being made available for education, public administration, or human resource development, describe (a) extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, and strengthens management capability of institutions enabling the poor to participate in development; and (b) extent to which assistance provides advanced education and training of people of developing countries in such disciplines as are required for planning and implementation of public and private development activities.	Formal and non-formal training in sustainable forest use will be an important element of the project.
22. Energy, Private Voluntary Organizations, and Selected Development Activities (FAA Sec. 106): If assistance is being made available for energy, private voluntary organizations, and selected development problems, describe extent to which activity is:	
a. concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot projects to test new methods of energy production; and facilitative of research on and development and use of small-scale, decentralized, renewable energy sources for rural areas, emphasizing development of energy resources which are environmentally acceptable and require minimum capital investment;	N/A
b. concerned with technical cooperation and development, especially with U.S. private and	The project involves U.S. and local private and voluntary organizations,

voluntary, or regional and international development, organizations;	and will encourage increased technical cooperation and development.
c. research into, and evaluation of, economic development processes and techniques;	N/A
d. reconstruction after natural or manmade disaster and programs of disaster preparedness;	N/A
e. for special development problems, and to enable proper utilization of infrastructure and related projects funded with earlier U.S. assistance;	N/A
f. for urban development, especially small, labor-intensive enterprises, marketing systems for small producers, and financial or other institutions to help urban poor participate in economic and social development.	N/A
23. Capital Projects (Jobs Through Export Act of 1992, Secs. 303 and 306(d)): If assistance is being provided for a capital project, is the project developmentally sound and will the project measurably alleviate the worst manifestations of poverty or directly promote environmental safety and sustainability at the community level?	N/A
C. CRITERIA APPLICABLE TO ECONOMIC SUPPORT FINDS ONLY	
1. Economic and Political Stability (FAA Sec. 531(a)): Will this assistance promote economic and political stability. To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA?	C.1-6 All N/A. This is a DA-funded project.
2. Military Purposes (FAA Sec. 531(e)): Will this assistance be used for military or paramilitary purposes?	
3. Commodity Grants/Separate Accounts (FAA Sec. 609): If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? (For FY 1993, this provision is superseded by the separate account requirements of FY 1993 Appropriations Act Sec. 571(a), see Sec. 571(a)(5).)	
4. Generation and Use of Local Currencies (FAA Sec.	

531(d)): Will ESF funds made available for commodity import programs or other program assistance be used to generate local currencies? If so, will at least 50 percent of such local currencies be available to support activities consistent with the objectives of FAA sections 103 through 106? (For FY 1993, this provision is superseded by the separate account requirements of FY 1993 Appropriations Act Sec. 571(a), see Sec. 571(a)(5).)

5. Cash Transfer Requirements (FY 1993 Appropriations Act, Title II, under heading "Economic Support Fund," and Sec. 571(b)). If assistance is in the form of a cash transfer:

a. Separate account: Are all such cash payments to be maintained by the country in a separate account and not to be commingled with any other funds?

b. Local currencies: Will all local currencies that may be generated with funds provided as a cash transfer to such a country also be deposited in a special account, and has A.I.D. entered into an agreement with that government setting forth the amount of the local currencies to be generated, the terms and conditions under which they are to be used, and the responsibilities of A.I.D. and that government to monitor and account for deposits and disbursements?

c. U.S. Government use of local currencies: Will all such local currencies also be made available to the U.S. government as the U.S. determines necessary for the requirements of the U.S. Government, or to carry out development assistance (including DFA) or ESF purposes?

d. Congressional notice: Has Congress received prior notification providing in detail how the funds will be used, including the U.S. interests that will be served by the assistance, and, as appropriate, the economic policy reforms that will be promoted by the cash transfer assistance?

6. Capital Projects (Jobs Through Exports Act of 1992, Sec. 306, FY 1993 Appropriations Act, Sec. 595): If assistance is being provided for a capital project, will the project be developmentally-sound and sustainable, i.e., one that is (a) environmentally sustainable, (b) within the financial capacity of the

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government or recipient to maintain from its own resources, and (c) responsive to a significant development priority initiated by the country to which assistance is being provided. (Please note the definition of "capital project" contained in section 595 of the FY 1993 Appropriations Act.)

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08/03/93

ANNEX C
HOST COUNTRY REQUEST FOR ASSISTANCE

Presidencia de la República

SECRETARIA NACIONAL DEL MEDIO AMBIENTE
BOLIVIA

FILE AGR		
OFFICE	ACTION	INFO
D		✓
DD		
ECON		
RLA		
EXO		
DP		✓
PD&I		✓
CONT		
HHR		
AND	✓	
PS		
Reply due 9/1		
Action tkn		

La Paz, 16 de agosto de 1993
DES.SOST. C-No. 0018/93

RECEIVED
USAID
18 AGO. 1993
LA PAZ

Señor
Carl H. Leonard
Director
USAID - BOLIVIA
Presente.-

Señor Director:

Como es de vuestro conocimiento y dentro del nuevo contexto que se quiere dar a las relaciones de Bolivia con los Estados Unidos de Norteamérica, donde la protección del Medio Ambiente tiene un rol de suma importancia y la oportuna cooperación técnica enviada por el Vicepresidente de los Estados Unidos Albert Gore, permitirán a Bolivia enfocar de manera más efectiva el manejo sostenible de nuestros recursos naturales.

El anterior gobierno de mi país en colaboración directa con la Misión de USAID/Bolivia arrancó con el diseño de un proyecto que nos permitirá contar con un proyecto de Manejo Sostenible de Bosques en Bolivia y que mediante el cual, Bolivia podrá contar hasta el año 2000 con la capacidad institucional tanto pública como privada de certificar que los productos extraídos de nuestros bosques, provienen de bosques utilizados en forma sostenible.

La actual administración ha tenido la oportunidad de revisar el documento del proyecto "MANEJO SOSTENIBLE DE BOSQUES", diseñado por técnicos de ambos gobiernos, considerando que la ejecución del mismo en Bolivia, será de mucha importancia para el desarrollo de tecnologías, recursos humanos e institucionales, que nos permitirá encarar los desafíos nacionales e internacionales previstos para u futuro próximo.

Mediante la presente, solicito a Ud. la donación de $us. 15.000.000 por parte del gobierno de los Estados Unidos de Norteamérica al gobierno de Bolivia, para la puesta en marcha y ejecución del proyecto "MANEJO SOSTENIBLE DE BOSQUES". Por su parte el gobierno de Bolivia se compromete a proveer por lo menos $us. 5.000.000 con

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Plaza Isabel La Católica Nº 2479 - Teléfonos 361647 - 327835 - Fax Nº (591-2) 369304 - Casilla 12814 - La Paz

Presidencia de la República
SECRETARIA NACIONAL DEL MEDIO AMBIENTE
BOLIVIA

fondos de contrapartida provenientes de nuestro programa de la Secretaría Ejecutiva del P.L.480/Título III. La vida útil del proyecto deberá ser de por lo menos siete años a partir de la fecha de suscribirse el convenio bilateral de donación entre ambos gobiernos.

El Ministerio de Planeamiento y Coordinación será el responsable de la firma del convenio bilateral conjuntamente con el Ministerio a mi cargo. Quedando la Subsecretaría de Promoción y Cooperación Internacional a cargo de la contraparte nacional.

Sin otro particular, aprovecho la oportunidad para saludarlo atentamente.

Lic. José Guillermo Justiniano S.
MINISTRO DE DESARROLLO SOSTENIBLE

c.c. Archivo.
JGJ/ep.

irección Actual: Mendez Arcos N° 710 Plaza España - Teléfono 369383 - Fax (591-2) 369304 - Casilla 12814 - La Paz
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ANNEX D
PROJECT ANALYSES

Annex D1a Technical: Research & Training
Annex D1b Technical: Natural Forest Management
Annex D1c Timber Products
Annex D2 : Environmental Assessment
Annex D3 : Social Soundness
Annex D4 : Policy Context Analysis
Annex D5 : Economic Analysis
Annex D6 : Financial Analysis
    Attachment 1 : Financial Analysis
    Attachment 2 : Budget Assumptions
    Attachment 3 : Budget Summary Cat.& Currency Req.
    Attachment 4 : Budget for the PP
Annex D7 : Administrative

ANNEX D1a
TECHNICAL: RESEARCH AND TRAINING

OBJECTIVES

Training. To provide training for the Bolivians responsible for the protection and sustainable use of Bolivian forests. Training will include both technical courses for forest managers and advanced courses for researchers. Foresters, social scientists, ecologists, wildlife biologists, and resource economists will be provided training opportunities.

Research. To sponsor research needed as a basis for rational forest use. This research will be conducted primarily by Bolivian scientists and students working on thesis projects.

Information Dissemination. To disseminate the results of formal and informal research that will contribute to the protection and sustainable use of forests in Bolivia and elsewhere in the region.

SUMMARY OF EXPECTED OUTPUTS

Training

- Senior theses (licenciatura and ingeniero forestal) completed in forestry and related disciplines.
- M.S. and M.A. degrees conferred.
- At least 5 one-day workshops per year on BOLFOR project related issues.
- One course per year each for "decision makers."

Research

- Ecological certification.
- Understanding of the major factors influencing the reproduction, growth, and commercial yield of various species.
- Determination of the sustainable intensity of harvesting for various species.
- Documentation of the environmental consequences, including impacts on fauna, soil and water quality and quantity of various forest product harvesting intensities and methods.

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- Design of silvicultural systems that enhance the commercial yields of forest products but reduce the negative environmental impacts of management.

Information Dissemination

- Publication in scientific journals of various articles authored or co-authored by Bolivian scientists.

- Presentation of BOLFOR-sponsored research results in at least one national and one international symposium.

1.0 BACKGROUND

Bolivian forests are being logged at a rapid rate, forest management efforts are exceedingly rare, the data base for sustainable forestry is virtually non-existent, and few Bolivians have the training that would allow them to address the technical and scientific issues upon which ecologically, socially, and economically acceptable forest management practices could develop. Furthermore, some holders of large forest concessions (upon whom the fate of much forest depends) behave as if they do not recognize the need for forest management. The BOLFOR project will contribute towards the development of a cadre of trained forest managers and researchers and will help increase awareness of the benefits of sound forestry methods. Forestry training, research, forest management demonstrations, and information dissemination will be inextricably linked in this project; for the purposes of clarity, however, these topics will be treated in separately below.

1.1 Forest Protection and Sustainable Use

A trained cadre of forestry (in the broad sense) professionals and technical staff is a prerequisite for sustainable forest management in Bolivia. Expatriate "experts" have a role to play as research advisors, trainers, and independent project evaluators but the primary and long-lasting results of the BOLFOR project should be enhanced human capacity to protect and manage forests. Through communication of its results to others responsible for the fate of forests in Bolivia, elsewhere in Latin America, and the world, the BOLFOR effect will be enhanced. Truly significant results of the BOLFOR research and training efforts will be achieved if the sustained production from natural forests is economically viable, its negative impacts are minimized, and the harvested materials are suitably processed and marketed.

1.2 Forest Management and Silviculture to Augment Yield of Forest Products

Forest management techniques for increasing the sustainable yield of commercially valuable forest products will be developed and tested during the BOLFOR Project. Given the paucity of information about the ecology of Bolivian forests, much basic data will need to be collected in the process of selecting appropriate silvicultural approaches. There are, however, a number of fairly standard silvicultural techniques that will be tested early-on by the project. It is obvious, for example, that a fire management program needs to be instituted and that logging damage should be reduced. Among the available stand

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improvement techniques, the BOLFOR project will initially concentrate on the ecologically most gentle and least costly methods (e.g., liberation thinning).

2.0 THE EXISTING SITUATION

A substantial number of research and training programs are underway in Bolivia. With a few prominent exceptions, however, only limited progress is currently being made towards the goals of forest protection and sustainable use. The alarmingly high rate of deforestation in Bolivia is testimony to this failure.

2.1 Current Research Activities

The following are brief summaries of research projects related to the goals of the BOLFOR project.

2.1.1. UAGRM Museum, Herbarium and Department of Forestry

There is a solid core of students and faculty interested in forest management and protection at the Universidad Autónoma Gabriel Rene Moreno (UAGRM) in Santa Cruz de la Sierra. Faculty and students from the Department of Forestry are involved in research on forest inventory, management, and wood technology. Much of their effort to date has been directed at the University's experimental forests. Recently the UAGRM Department of Forestry created a semi-autonomous research institute (INIF) to facilitate forest research by students, faculty, and university affiliates. INIF is autonomous from the university on matters financial and administrative; strong cooperation with CIMAR is planned. To date the institute does not have much of a "track record" but its goals overlap almost entirely with the goals of BOLFOR. Students and faculty in biology and the social sciences at UAGRM are involved in a wide variety of research projects including economic botany, wildlife ecology, and rural sociology.

2.1.2 Centro de Investigación y Manejo de Recursos Naturales Renovable - U.A.G.R.M. (CIMAR, Santa Cruz de la Sierra)

CIMAR is a public, non-partisan organization dedicated to research and technology transfer in the field of renewable natural resource management, with emphasis on forest science, agricultural ecology, and human ecology. While affiliated with UAGRM, CIMAR is financially and administratively independent of the University.

The goals of CIMAR are to facilitate investigation of natural resource management in Bolivia. Many of the current projects administered by CIMAR involve the use of their Geographical Information System to map the distribution of indigenous groups, hydrographic information, and patterns of biodiversity. They are also investigating the effects of mechanization of agriculture and drainage on soil properties in Santa Cruz. One objective of CIMAR is to make the technology of Geographical Information Systems accessible to

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students and land managers. To achieve this goal they will offer a series of workshops and training sessions for the various potential GIS user groups.

2.1.3 Wildlife Conservation Society (WCS; Formerly Wildlife Conservation International)

WCS sponsors research and provides training for Bolivian researchers interested in wildlife conservation and management. Dr. Andrew Taber, WCS's full-time staff member in Santa Cruz, dedicates himself to training of Bolivian students and the conservation of Bolivian plants and animals. WCS-funded research being supervised by Dr. Taber is focussed on the Bajo Paragua area, including studies in Noel Kempff Mercado National Park and Rios Blanco y Negro Wildlife Reserve.

2.1.4 World Wildlife Fund (WWF)

WWF contributes to forest management-related training and research in many parts of Bolivia. Major goals of the WWF program are to strengthen the training of foresters and forest workers, to build up library facilities and access to bibliographic information, and to improve communication between forest researchers and forest managers, be they indigenous committees or large corporations. Their methods for attaining these goals include sponsoring workshops, offering training courses and providing funding for students working on thesis projects.

2.1.5 Centros Regionales de Investigación (CRI)

The network of seven CRI's in Santa Cruz Province represents a substantial effort in agroforestry research, training, and extension services. The CRI's are operated by the Centro de Investigación en la Agricultura Tropical (CIAT) and are funded in part by the British Overseas Development Administration (ODA). Presently natural forest management is not a priority of the CRI but most of the centers include substantial areas of logged-over and secondary forests that are appropriate for silvicultural research, training, and demonstrations.

2.2 Currently Functioning Training Programs in Bolivia

There are a multitude of educational institutions in Bolivia that provide training on topics related to forest protection and sustainable use in Bolivia. The general quality of the education, however, is reportedly quite low. University faculty repeatedly mentioned the poorly developed basic skills of many of their students. Training for field staff is also very limited. Finally, there are apparently no institutions of higher learning in Bolivia where scientific methods (e.g., research design and statistical techniques) are well taught. The result of this deficiency of trained researchers and lack of training in research techniques is that there is virtually no Bolivian capacity to develop a scientific basis for natural forest management. BOLFOR will work with local scientists to help address this need.

Opportunities for improving educational programs in Bolivia abound; BOLFOR will begin by working closely with a limited number of institutions with the full intention of expanding its network country-wide.

2.2.1 University-level Education

Obtaining an undergraduate degree in Bolivia requires 5-6 years after secondary school, including the time necessary to carry out what in the USA would be called a "senior thesis" project. Actually the time and effort invested in Bolivian thesis projects is equivalent to a Masters degree in the USA but lack of supervision substantially reduces the quality of research conducted. For many Bolivian university students, however, obtaining a licenciatura or Ingeniero Forestal degree is precluded by lack of funds for thesis research. As a result, there are many more students classified as "egresados" (= students with course work successfully completed but who lack a thesis) then there are students with degrees.

The BOLFOR Project planning team commissioned an extensive review of universities offering degrees in forestry. It appears that lack of research experience, generally low quality of faculty training, and shortages of financial support for research and in-service training are system-wide problems.

2.2.2 Escuela Técnico Superior, Cochabamba

Technical training in forestry is provided by the Escuela Técnico Superior in Cochabamba. The program last for three years after secondary school; graduates receive the USA equivalent of an Associates Degree. Part of the training is carried out at the school's experimental forest in the Valle de Sajta.

2.2.3 Forest Guard Training Program, UAGRAM

This recently instituted 6-month program for forest guards did not get off to a good start but nevertheless has potential. The goal of the program is to provide forest guards with basic training in mensuration, silviculture, harvesting, and forest protection. The entrance requirements are quite low (e.g., basic literacy).

2.2.4 Park Guard Training Program

Park guard training in Bolivia is in its infancy but the program (funded in part by WWF) has already produced excellent results. The 6-month long curriculum includes lectures and discussions on conservation biology, natural resource law and economics, environmental education, public relations, law enforcement, and first aid. Instead of maintaining a central training faculty, the courses are held in the parks themselves, changing venue annually, on demand.

2.2.5 Forest Worker Training

Apparently chainsaw and skidder operators, timber cruisers, and other forest workers as yet receive no formal training.

3.0 PROJECT STRATEGY AND STRUCTURE

3.1 Integration of Research, Training, and Information Dissemination

It is clear that training will be important in all project-sponsored activities, that research supporting ecologically-sound and economically viable approaches to forest management and protection will be undertaken, and that the information obtained will be disseminated.

3.2 Integration with other Research and Training Efforts in Bolivia

A principal objective of the BOLFOR project is to augment the capacity of Bolivians to protect and manage their forests. This goal will best be achieved by providing training and research opportunities for representatives of both the public and private sectors, economists as well as ecologists, policy-makers, and foresters. In other words, BOLFOR will provide educational services to groups and individuals responsible for the maintenance of forest cover in Bolivia. It is imperative, therefore, that BOLFOR maintain strong linkages with as many as possible of the research groups, training centers, conservation groups, and forest users in Bolivia. Affiliation with CIMAR will help provide linkages with Bolivian national groups; international cooperation (e.g., IDB, World Bank, ODA) will be coordinated by the Team Leader (see section 3.4).

During the initial phases of the BOLFOR project, major effort will be expended on research training and forest inventory. The project's closest ties, therefore, will be with Bolivian universities, including the herbaria in La Paz and Santa Cruz, and other research groups. Participation in training courses and eligibility for financial support for research, will not be restricted to any particular bureaucratic entity or geographical area of origin but priority will be given to projects that are well integrated into the overall BOLFOR project design.

4.0 TRAINING PROGRAMS COORDINATED BY BOLFOR

4.1 Semester-Long Diploma Course in Forest Resource Management Ecology, and Conservation Biology

This intensive course will be based at the Biology and Forestry Departments of the Universidad Autónoma Gabriel Rene Moreno (UAGRM). The students will be 20 recent graduates ("egresados") from any Bolivian university, students who have already completed their undergraduate theses ("licenciaturas" and "ingenieros"), and inexperienced researchers associated with public (e.g., CDF) and private organizations (e.g., Promabosque, Cámara Nacional Forestal). The course will be held annually from January through April (i.e.,

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during the rainy season) and will be followed by a two-month long field course in ecological and silvicultural methods with emphasis on experimental design and research proposal preparation (see section 5.1.1). Proposals on BOLFOR project related topics will be submitted to BOLFOR staff for funding (see section 5.2). Participation in the course will represent a full-time commitment on the part of the students and will require major time investments on the part of the faculty. Successful course participants will be awarded a special diploma.

The primary instructors in this course will be the forest ecologist, wildlife biologist, and socio-economist/anthropologist on the BOLFOR staff. Funds will also be provided for guest lecturers who will address issues related to environmental law, soil science, and other topics complementary to the expertise of the principal instructors. The BOLFOR coordinator of research and training activities will be responsible for course related logistics (e.g., transportation and accommodation arrangements).

The course syllabus will emphasize forest protection and sustainable use but will cover topics ranging from application of the scientific method and island biogeography theory to GIS methods and anthropological methods. A condensed draft of the syllabus is provided in the appendix. The goal of the course and the intensive field module that will follow (see section 5.1.1) is to help develop a cadre of Bolivian scientists prepared to address the environmental and social problems that plague efforts to maintain forest cover. Hopefully, comradeship developed during the training course will translate into better communication among key offices in the future as course participants begin their professional careers. Course participation should also facilitate collaboration and joint project planning.

Field Course: Ecological, Silvicultural, and Socioeconomic Field Methods

Following the 4-month long course described above (section 5.1), course participants and faculty will commence a 2-month long intensive field course. The course will be held in Bajo Paragua Forest Reserve, with most activities confined to the Moira Concession. Emphasis during the first phase of the course will be on field methods (e.g., census techniques for mammals and stream invertebrates, timber inventory methods, and voucher sample preparation). The second phase will focus on the clarification of testable hypotheses, experimental design, and data analysis. During the final phase the students will design a research project that they will conduct after the course, refine their research methods, collect preliminary data, and write a research proposal. These proposals will be considered for funding by an evaluation panel composed of BOLFOR staff and representatives from Bolivian universities, other GOB organizations, and the private sector (e.g., APCOB and the Cámara Nacional Forestal).

The pedagogical method employed in this course will be the experimental approach developed over the last 30 years in Costa Rica by the Organization for Tropical Studies (OTS). This approach basically consists of course participants learning to design, implement, and communicate the results of field research by designing, implementing, and communicating the results of a series of short-term studies. Evidence that this "learn-by-doing" approach is successful derives from the adoption of OTS methods in Colombia,

Ecuador, Brazil, Mexico, Malaysia, Australia, and many other countries. The BOLFOR course coordinator will benefit from the OTS experience by visiting Costa Rica and consulting with OTS staff.

4.2 Short Courses for "Decision-Makers"

An assumption of the BOLFOR project is that if people know that there are ecologically, economically, and socially acceptable alternatives to forest destruction, forests will be better treated. Foremost among the Bolivians influencing the fates of forests are governmental representatives, particularly legislators and their staff. If these people are aware that BOLFOR and other projects are making progress towards the goal of sustainable forest management, if they better understand the alternatives to forest destruction, and if they appreciate the forest more, the goals of BOLFOR are more likely to be achieved.

Week-long courses in ecology, conservation, forest resource use, and natural resource policies will be offered annually for elected officials and their aides (admission by invitation). Every effort will be made to assure that the experience is educational and pleasant. The course will focus on the environmental challenges being faced in Bolivia and their potential solutions. Course participants will be provided first- hand experience in relatively undamaged forest ecosystems as well as in areas in which natural resources are used in either questionable or environmentally-sound manners. The underlying ecological principles of the observed land uses as well as their economic, political, and social dimensions will be considered. Discussions will focus on environmental regulation, trade policies, taxation, technology transfer, and other policies that influence forest protection and use in Bolivia.

4.3 Short Courses for Representatives of the "News Media"

The accuracy and quantity of information disseminated from the BOLFOR project will both be enhanced by the education of the news media. Progress towards this goal will be made using a format similar to that described for the "decision-makers" course (see Section 4.4) but with a shorter format (4 vs. 7 days).

4.4 Short Courses on Participatory Research Methods

Training courses of three weeks duration in participatory research methods for social science will be offered annually to interdisciplinary groups of local scientists, NGO members, extension specialists, and community representatives. The training will emphasize the analysis of small-scale, family or community-based systems of production, the limitations they confront, and the interrelationships among household members, forest products, markets, and other infrastructural elements. Participants will investigate the institutional and administrative requirements to improve forest management practices and the well-being of local populations.

4.5 Short Courses on Gender Analysis

One-week training sessions in gender analysis will be offered to project participants.

This training will be provided by short-term external consultants from a university in the U.S.A. in collaboration with the social science post-doctoral research associate.

4.6. Short Courses and Workshops on Technical Issues

A series of courses will be offered on forest management, inventory techniques, GIS, marketing, processing, eco-certification, market analysis, cooperative management, etc. The target audiences will range from concessionaires to indigenous cooperative members, and governmental and non-governmental agencies. Specific issues to be addressed will vary as the BOLFOR project develops.

4.7 Short Courses on Research Methods

With increasing scientific expertise, there will be increased call for specialized courses in experimental design, research methods, and statistical analysis. Modular courses on research methods will be offered as need arises. It is already clear, however, that researchers interested in sustainability analysis will need training in matrix algebra beyond that of a regular research methods course.

4.8 Short Courses for Forest Workers

Training in reduced impact logging for skidder operators, directional felling for sawyers, and road drainage for bulldozer drivers are three examples of the sorts of courses to be sponsored by the BOLFOR project. These courses will be carried out in different locations as demands develop and opportunities arise.

5.0 BOLFOR SPONSORED RESEARCH

5.1 Types of Research Needed

Shockingly little is known about the forest resources of Bolivia. The regeneration requirements of the major commercial forest products are not known, data are not available on stocking, timber and non-timber forest product processing approaches need improvement, and marketing systems require substantial expansion. The BOLFOR project will contribute towards building knowledge as necessary for rational use and protection of Bolivian forests.

Development of ecologically-sound and economically-viable approaches to forest management in Bolivia depends on the availability of data derived from well designed research projects. Although some of the required research will necessarily be large-scale and long-term, a multitude of problems exist for which solutions could be found within a relatively short period of time (e.g., months). Building the Bolivian research capacity will be one of the long-term benefits of the BOLFOR project. Furthermore, during the training process, many problems faced by the project will be addressed.

5.1.1 Forest Ecology

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Studies of forest ecology are needed as a basis for sustainable forest management. Research on the effects of fires and windstorms, for example, will be of high priority. With the aid of vegetation maps, species-site relations can also be investigated.

In order to manage a forest in an economically viable and ecologically sound manner, a great deal must be known about the biology of the component species. Under what conditions do they reproduce successfully? At what time of year are ripe fruits produced? Do the seeds germinate quickly or retain viability for long periods of time? What animals eat the fruits, disperse the seeds, or prey upon seeds? What herbivores are important and under what conditions are the effects of herbivory most severe? What factors (both biotic and abiotic) control growth and survival? How can growth and survival be enhanced? These are just a few of the questions that need to be addressed for the species for which the forest is being managed.

Information on the ecological basis of tropical forest management is accumulating rapidly; to maximize effectiveness, researchers in this field need to keep up to date with new methods, perspectives, observations, and other developments. To assure that BOLFOR researchers remain current and to facilitate student and faculty exchange between Bolivia and the U.S.A., senior BOLFOR researchers (ecologist, forester, and social scientist) will have official positions at a major research university. These positions will be classified as either "Post-Doctoral Research Associates" or "Affiliated Researcher" and will permit use of university facilities (e.g., libraries and main-frame computers).

5.1.2 Population Biology of Timber and Non-timber Product Producing Species: Sustainability of a Harvesting Regime

Determining the sustainability of a harvesting regime for many non-timber forest products requires the same sorts of data as for harvesting timber trees. While the particular non-timber forest products upon which the BOLFOR project will focus will be decided after the project has commenced here we use palm heart harvesting as an illustrative example. Analyzing the sustainability of harvesting products that do not necessitate killing the plant will differ in focus but the general approach will be the same.

Euterpe edulis ("asai") is a common palm in the Bajo Paragua area and the source of what is considered a very delicious palm "heart" (i.e., the terminal bud, also known as palm cabbage or palmito). Unfortunately, harvesting the terminal bud of *E. edulis* requires killing the plant. Over-harvesting has decimated populations of this and other palmito producing palms in South America and elsewhere in the tropics. Selective harvesting of *E. edulis*, in combination with regeneration-enhancing treatments is theorically sustainable; Bolivian palmito producers are poised to benefit from the short and long-term economic benefits that would accrue with a sustainable (and thereby ecologically certifiable) harvesting program. The BOLFOR project will support the research basis for development of a sustainable palmito management program.

Euterpe edulis population harvesting sustainability analysis will be carried out in areas where palmito is harvested and in otherwise similar but non-harvested areas. To accurately assess the population-level effects of alternative harvesting regimes, researchers trained by the project and working through the UAGRM Museum/ Herbarium will establish at least five permanent plots each in harvested and unharvested areas. When some basic natural history data on *Euterpe* are available, additional plots will be set up in managed as opposed to simply exploited areas. Each plot will include at least 25 individuals in each of 5-10 size classes (e.g., seedlings and palms of different height). Leaves on a random subsample of plants will be marked and leaf production rates monitored over the length of the project. In order to estimate population stability within a few months of project initiation, the researchers will use leaf production rate data from the literature to calculate transition probabilities between size classes and assume survivorship probabilities using current population structures. As data on growth and survival from the plots become available, these initial estimates of population stability will be modified accordingly.

Controlling harvesting intensity and harvesting individuals in size classes with low reproductive value (as determined by sensitivity analysis of the population matrices) is only the first step towards a sustainable management program. Associated studies will also be conducted on factors influencing the survival and growth of *Euterpe* palms. On the basis of the results of these studies, specific silvicultural treatments (e.g., removing competition around potential crop trees or stand thinning) will be developed and tested.

The BOLFOR project will focus on more than just a sustainable harvesting; ecological sustainability of different harvesting regimes will also be assessed. Research questions such as the following will be addressed:

- What is the effect of palmito harvesting on other plant and animal species in the community?
- Do palmito harvesters also hunt or collect other forest products? If so, what are the effects of these activities?
- Since *Euterpe* palms are concentrated in wetlands, it will be important to determine whether there are any adverse effects of harvesting on water quality.
- Will development of the palmito industry attract additional people to the region and thus contribute to environmental deterioration?

These and other research questions will be addressed by the multidisciplinary team of Bolivian researchers whose activities will be supported by the BOLFOR project. As other forest products are considered for inclusion in the project, a similar series of studies will be conducted.

5.1.3 Physiological Ecology of Timber and Non-Timber Forest Resource Producing Species

Demographic studies on commercially exploited plant species and species with commercial potential (see section 5.1.3) will be complemented by studies of their physiology. The exact nature of these studies will vary with species and environmental conditions but emphasis will be put on factors influencing growth and yield of commercially valuable products. Research on water, carbon, and nutrient relations along with studies of shade tolerance will provide a basis for designing management techniques.

5.1.4 Wildlife Monitoring

A research and monitoring program will be established to study the impacts of different forest management methods on biodiversity and ecological sustainability. This will be a broad based research program that will collect baseline information at the start of the BOLFOR Program, and will continue to monitor changes and impacts throughout the program's seven years.

During the first year of the project work will concentrate on general surveys to obtain an overall picture of the patterns of distribution, diversity and abundance of wildlife species in the various sites. Once an overview is obtained, permanent monitoring plots will be established where a range of wildlife variables will be measured. An estimated 30 weeks of effective field work (plus many weeks probably lost to bad weather and difficult travelling conditions) will be undertaken each year by the research team. A total of 10 different 100 ha sampling plots will be sampled annually as part of the monitoring program. As logistics

permit, sampling will be conducted in both the wet and dry seasons. Plots will be distributed to maximize the number of logging and extraction regimes sampled, as well as to represent different ecosystems. Plots will also be established in areas where no logging or hunting occurs (perhaps in Noel Kempff Mercado National Park), as well as in areas where hunting but no logging occurs, as a means of providing baselines against which to tease apart different management effects.

The state of the art monitoring methods to be used are summarized in generalized form for each taxonomic group below.

Mammals

- Large conspicuous mammals such as peccaries, tapirs, deer and primates will be surveyed by diurnal and nocturnal transect censuses. These will be supplemented by track plots, scent stations, and scat analysis.

- Use of wildlife "hot spots" such as salt licks, water sources, and abundant fruit sources (e.g. fruiting fig trees) will be monitored, both during the day and at night, as a means of obtaining additional data on relative abundances and other data (e.g. white-lipped peccary and collared group sizes, and age/size class distribution).

- Bat diversity and relative abundance will be surveyed by using mistnets.

- Small terrestrial and arboreal mammals will be live trapped and marked for long term capture-recapture studies to monitor changes in population density and overall biodiversity.

Birds

- Diversity and relative abundance of birds will be assessed at each study plot using a variety of techniques including fixed listening posts, transects, and mist netting both at ground level and in the canopy.

- Line transect methods will be used to monitor changes in the population density of large birds such as cracids and tinamous.

Amphibians and Reptiles

- Amphibian and reptile diversity and relative abundance will be sampled during the second and seventh year of the project. Standard drift netting techniques and traps will be used. Studies on frogs in particular, will provide an opportunity to monitor population and community changes within the context of logging and other extractive operations.

Butterflies

- Butterflies are a useful index of overall levels of biodiversity. In the second and seventh year of the project visual counts and collection of specimens will be performed at salt licks and water sources as a means of determining levels of biodiversity and relative abundances in the different study plots.

Forest Phenology

- Studies of fruit production and seasonality will be conducted to identify major food sources and keystone species for frugivores. This will be done in coordination with forestry management research projects. Phenological data will be collected monthly for at least two years in each plot; many of these data will be collected by trained park guards.

Aquatic Animals

- Logging operations and upstream deforestation can have major impacts on river systems through erosion and water contamination. Furthermore, Bolivian rivers harbor a variety of endangered as well as economically important species. Due to these factors river surveys will be conducted on important water courses in Paragua Forest Reserve during the first, fourth and seventh year of the project. On these surveys the diversity and density of caimans, river turtles, and aquatic mammals such as giant otters, river dolphins, capybaras, and tapirs will be studied. In addition, limited data will be collected on fish diversity and various water quality parameters.

5.1.5 Impacts of Logging on Wildlife and the Potential for Sustainable Use

There are few data on the ecological importance of different vertebrate species in structuring tropical forest communities, or on the impact of logging on wildlife. While the monitoring program outlined above will uncover general trends, it will required detailed ecological research to tease apart the factors resulting in changes in the diversity and abundance in wildlife populations under different forestry management practices. Additional data will also be necessary before it will be possible to evaluate the potential to sustainably harvest specific wildlife species. Outlined below is a program of ecological research on several keystone species which either are (i) likely to be negatively effected by extraction (e.g. primates) and/or (ii) have potential for sustainable harvest (e.g. ungulates). Information from these studies will contribute to the design of forest management practices that will minimize losses of biodiversity.

Peccaries, tapirs and deer, and other ungulates represent the most important taxonomic group providing protein and skins for rural inhabitants in the neotropics (Redford and Robinson 1987). Peccaries, in particular, are good candidates for sustainable harvesting due to their relatively high intrinsic rate of increase. Preliminary data on the role of ungulates in structuring forest vegetation as seed predators and disperses stresses their

ecological importance. However, many aspects of their biology that are necessary to understand for their sustainable harvest and protection under sustainable forestry are still little understood. Peccary, tapir and deer densities will be estimated by line transects as part of the monitoring research program. In addition, a detailed ecological study will be conducted, focussing particularly on white-lipped peccary and tapir population demography, ranging behavior, role as seed predators and disperses, and response to logging operations.

Monkeys will also be a focus of research on the effects of different logging practices on populations, and will be the base of another detailed study. Slow reproduction rates and low intrinsic rates of increase mean that these species are particularly threatened by environmental perturbations, especially hunting. Species diversity, groups size and age/sex composition, and demography will be compared between areas and habitats over time. Research will focus on the response of specific primate groups of different species to disturbance by obtaining baseline information before and after logging operations. Movements of some individuals prior to, during, and after logging operations will be monitored using conventional radio-telemetry equipment.

Specific, yet less intensive ecological research on the impacts of logging will be conducted as part of the monitoring program: e.g., the demography of small mammal communities will be assessed by trapping and netting before, during, and after selective logging; the response of cracid populations to logging will be a focus of study in the ornithological component of the monitoring program, students will be encouraged to undertake studies of pollination or seed dispersal of important tree species; and the diet and role as seed disperses of some mammals species will be assessed through scat analysis. Also, since extensive long term research will be undertaken it is likely that we will encounter sick animals and it will be important to have the capability to conduct pathological studies when the opportunities present themselves. We note in this regards that some species such as white-lipped peccaries are in decline in many areas and some authors have attributed this to disease.

5.2 Small Grants Program

A major portion of the knowledge base for sustainable forest management in Bolivia will be provided by Bolivian students working on thesis projects. Financial support for BOLFOR-related research will be provided in the form of competitive grants. Funding will cover all research expenses (e.g., equipment and supplies), travel, and a living allowance. Grant applications will be evaluated by BOLFOR staff in conjunction with FONAMA, SENMA, USAID, and representatives of Bolivian universities and other public and private agencies involved in forest management and conservation.

Input will also be sought from the faculty associates with which BOLFOR's forester, ecologist, and social scientist are affiliated.

6.0 INVOLVEMENT WITH EXISTING TRAINING PROGRAMS

6.1 Forest Guard/Park Guard Training

The UAGRM and LIDEMA courses for forest guards and park guards, respectively, have much to offer. While the focus of the former is in some ways more appropriate for BOLFOR, much of the syllabus of the LIDEMA-sponsored park guard training program covers material useful to forest guards. Furthermore, the LIDEMA program is apparently better run and has more experience than the UAGRM program. The BOLFOR project will investigate possible ways of integrating these two programs, perhaps combining the first half of the training course while subjects needed by both park and forest guards are being covered. Scholarships will be offered each year by BOLFOR to qualified students, including several members of the Chiquitano community.

6.2 Escuela Superior Técnico, Cochabamba

Due to the scarcity of intermediate-level foresters in Bolivia, BOLFOR will support the program of the Escuela Superior Técnico by offering scholarships to qualified students on a competitive basis. If BOLFOR-sponsored training courses are offered at the school's experimental forest in the Valle de Sajta, funds will be allocated for the necessary renovations. Finally, faculty at the Escuela Técnico will be invited to apply for admission to BOLFOR-training programs and for research grants.

6.3 University-level Programs

BOLFOR will help improve the quality of undergraduate instruction in Bolivia through its training programs, research grants, scholarships, and faculty exchange. Faculty and students from all Bolivian universities will be eligible to apply for participation in these programs.

6.4 CATIE Forest Management Course

Bolivian student participation in the 6-week intensive course in forest management offered in Costa Rica by CATIE has already had a positive environmental effect; the Chiquitano Community Forest Management Project is spearheaded by course graduates. BOLFOR will provide scholarships so that more Bolivian students have the opportunity to attend this well-run course.

6.5 Postgraduate Studies

Bolivia is in desperate need of natural scientists and social scientists interested in environmental affairs. For example, at present there are few Bolivian ecologists or foresters capable of undertaking the research upon which sustainable forest management practices can be built. There are few social scientists capable of conducting the appropriate studies for integrating the human component into forest management strategies. Natural resources economists in Bolivia are extremely scarce and there are few natural resource policy experts

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capable of transforming new forest management insights into new environmental regulations. BOLFOR will contribute towards alleviating these deficiencies by providing scholarships for post-graduate study elsewhere in Latin America and the U.S.A. BOLFOR recognizes that post-graduate study is expensive and that having a graduate degree does not guarantee scientific expertise. Without trained scientists, however, attempts at changing the currently destructive forest use practices are certain to flounder.

7.0 INFORMATION DISSEMINATION

The BOLFOR project will best contribute to the cause of forest protection and sustainable use in Bolivia if the results of project-sponsored research and training programs are widely disseminated. Currently in Bolivia and in the world in general there is little understanding of the forces driving forest destruction and non-sustainable use; the alternatives are also little understood. As these forces and alternatives become apparent, BOLFOR staff will expend a great deal of effort on communication of their research results.

Information dissemination by the BOLFOR project will be accomplished through a series of interrelated and simultaneous activities. Researchers associated with the project will be expected to publish their findings and to present their results at national and international professional meetings; BOLFOR staff will support these initiatives. BOLFOR will also sponsor workshops and symposia in Bolivia on topics relevant to the project goals. For example, a workshop on eco-certification will help inform forest users in Bolivia of management alternatives and marketing opportunities. The training programs sponsored or supported by BOLFOR also represent a major forum for information dissemination. Even broader distribution of information will be possible through the news media. To enhance this process, BOLFOR will produce and distribute video documentaries on project activities in particular and sustainable forest use methods in general. These will range from short news releases to longer programs for broadcast in Bolivia, elsewhere in Latin America, and in the U.S.A.

8.0 TRAINING AND RESEARCH STAFF

If BOLFOR is to be successful in building Bolivian capacity for research and forest management, its forest ecologist, wildlife biologist, and sociologists will have to be experienced and productive scientists. In keeping with the BOLFOR philosophy, they need to be enthusiastic about collaborating with Bolivian thesis students and more experienced researchers from both public and private sectors.

In the rapidly developing fields of tropical forestry, ecology, and social science, researchers must be provided the opportunity to remain up-to-date. For the purposes of the BOLFOR project, this will be accomplished through formal relationships between the research staff and research institutions in the U.S.A. Because the researchers also need to be aware of natural resource policy and perspective changes, affiliation with conservation organizations will also be expected.

In would also be beneficial if the research staff were affiliated with a major research university in the U.S.A. The appropriate institution should be a leader in the field of tropical forest conservation and use, willing to participate in BOLFOR research and training programs, and be conveniently located for travel to and from Bolivia. It is expected that each of the BOLFOR long-term researchers will spend some time each year at the sponsoring university. The host university in the U.S.A. is also expected to be a source and recipient of graduate students and a participant in faculty exchange programs.

APPENDIX 1
A CONDENSED SYLLABUS FOR A SEMESTER-LONG COURSE—FOREST RESOURCE MANAGEMENT, ECOLOGY, AND CONSERVATION BIOLOGY

TOPIC 1: CONSERVATION BIOLOGY AND ECOLOGY

Fundamental theory

- Scientific method, approaches to research, and environmental management.
- Evolution, genetics, and population ecology (e.g., models of population growth, maximum sustainable harvests, minimum viable populations, genetic drift, and metapopulation analysis).
- Design of nature reserves, theory of island biogeography, habitat fragmentation, and species extinction.
- Physiological ecology of plants and animals.
- Community ecology (e.g., species interactions, keystone species).
- Population biology.
- Biodiversity issues.
- Captive breeding, reintroduction, and translocations.
- Environmental impact assessment.

Data collection and analysis

- Experimental design, sampling methods, and statistics.
- Population census techniques.
- Habitat analysis, cartography, remote sensing, and GIS.

Communication skills and information dissemination

- Writing research proposals, technical reports, and research papers.
- Preparing oral presentations, and using visual aids.
- Importance of personal computers, use of some computer software.
- Access to international information, E-mail.

TOPIC 2: BIOLOGICAL, ECONOMIC, AND SOCIAL CONDITIONS IN BOLIVIA

Habitat types in Santa Cruz and Bolivia

- Biogeography and vegetation types, human activities, and environmental impacts (problem identification and priorities).

Forestry activities

- Forest management systems (e.g., stand improvement methods, reduced impact logging).

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- Current forest uses for timber and non-timber forest products.
- Economic and social aspects of the forestry.
- Eco-certification of forest products.

Other activities that affect forests—case studies

- Resource use by indigenous peoples and other forest dwellers.
- Extractive reserves.
- Pet and skin trade, legal and illegal, markets, trade routes.
- Sport hunting and fishing.
- Shifting agriculture, small scale forest colonization.
- Industrial agriculture, pesticides and fertilizers.
- Coca plantations, cocaine processing labs, toxic wastes.
- Cattle ranching.
- Cost benefit analysis of alternative forest uses.

Other topics

- Natural resource law (CITIS; forestry laws, Pausa Ecológica, wildlife regulations, and laws pertaining to protected areas).
- Fundamentals of anthropology and methods for social science research.

ANNEX D1b
TECHNICAL: NATURAL FOREST MANAGEMENT

1.0 THE PROJECT

Goal. The goal of the proposed project is to reduce degradation of forest, soil and water resources and help conserve Bolivia's biological diversity.

Purpose. The purpose is to build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use. This will be accomplished through a tightly integrated set of activities including applied research, training, natural forest management demonstrations, value-added enterprises and marketing, and policy analysis and dialogue.

If the purpose stated above is achieved, the majority of the forests of Bolivia will be under legally defined and internationally certified site-specific management plans, either for the forest unit as a whole or for specific products. Progress will be measured by the establishment of commercial scale models of sustainable use based on research results.

2.0 OBJECTIVES OF FOREST MANAGEMENT COMPONENT

The ultimate goal of the BOLFOR Project is to develop sustainable and commercially viable forest management plans. Specific activities in the silvicultural component of the Project will be as follows:

- Develop and implement inventory methods for Bolivian forests.
- Design timber stand management plans based on ecologically-sound forest engineering principles.
- Test and utilize silviculturally-sound felling and timber extraction methods.
- Develop and apply timber stand improvement methods appropriate for Bolivian conditions.
- Analyze the cost effectiveness of the forest management methods adopted.

3.0 EXPECTED RESULTS

Detailed forest management plans for several Bolivian forests will be prepared. These plans will include all the stages of management, including timber stand inventory, harvesting methods, silvicultural treatments, and growth and yield studies. Forest management plans will be considered as successful when they are certified by a group

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officially recognized by the Forest Stewardship Council and adopted by Bolivian concessionaires and other forest resource users.

3.1 Outputs

3.1.1 Natural forest management

- Once appropriate strategies are identified through applied research and disseminated via commercial scale demonstrations and training, enterprises will implement Forest Management Plans for timber and non-timber forest products meeting national and international sustainability certification standards.

- Reduced rates of forest conversion to other uses on lands best suited for forestry under Bolivian land capability classification.

- Reduced forest degradation by destructive logging practices through adherence to low-impact harvesting guidelines.

3.1.2 Marketing

- More diversified enterprises adding value to a wider range of timber and non-timber forest products.

- A significant increase in the value of forest products exported from sustainably managed forests over the life of the project.

4.0 ENVIRONMENTAL CONSIDERATIONS IN FOREST MANAGEMENT

4.1 Congressional Concerns

Section 533(c)(3) of the 1991 Foreign Operations Appropriations Act prohibits the use of economic assistance funds for "any program, project or activity which would result in any significant loss of tropical forest; or involve commercial timber extraction in primary tropical forest areas". The act requires AID to make certain findings or determinations before supporting any activities that could directly or indirectly affect tropical forest conditions. Specifically, Section 533 requires AID to complete an environmental assessment which would accomplish the following:

- Make specific environmental findings and disclose environmental impacts on tropical forests.

- Determine whether impacts are of a significant nature.

- Determine whether commercial timber extraction will occur in primary tropical forest areas.

- Identify potential impacts from proposed activities on biological diversity within the affected area.

- Demonstrate that all timber extraction will be conducted according to an environmentally sound management system which maintains the ecological functions of the natural forest and minimizes impacts on biological diversity.

- Demonstrate that the activity will contribute to reducing deforestation.

4.2 Impacts of Current Practices

Although most Bolivian forests could be managed sustainably and profitably, forest management (as opposed to uncontrolled timber "mining") is virtually unknown in Bolivia. This situation needs to change rapidly or the commercial potential of most accessible forest in the country will be severely diminished. The goal of the BOLFOR Project is to contribute to changing this situation through training, research, and demonstration. The main contributions of the forestry component of BOLFOR will be to develop and demonstrate appropriate inventory techniques, forest engineering methods, harvesting technologies, and timber stand improvement treatments.

Bajo Paragua. There are apparently no data from the Bajo Paragua Forest Reserve on the effects of logging on forest structure, composition, ecosystem function, or the sustainability of resource use. On the basis of the EA team's visit to the Moira Concession in Bajo Paragua, however, some of the effects of logging can be described. Furthermore, to the extent that the conditions in Bajo Paragua resemble those in Chimanes Forest Reserve, effects of current logging practices in the former can be assumed from studies conducted in the latter by R.E. Gullison et al. Determining the nature and extent of logging effects in Bajo Paragua is one of the goals of the BOLFOR project.

Forest management is currently not practiced in the Bajo Paragua (nor elsewhere in Bolivia to the best of our knowledge); the forest is simply "high-graded" or "creamed" for high value logs. In the Moira Concession, 8-10 teams of about 10 contracted tree-finders each search the forest for trees more than 60-70 cm in diameter at breast height (1.4 m; DBH) of *Swietenia* ("mahogany" or "mara"), *Cedrela* ("tropical cedar" or "cedro") and *Amburana* ("tropical oak" or "roble"). They inscribe their initials on the trees to be cut and are paid by the number of trees they find. Relocating the trees is facilitated in some areas by a 200 x 200 m grid of cleared lines through the understory. During the dry season the same teams fell the selected trees and direct the skidder drivers to their locations.

The felling, timber extraction, and timber hauling practices in the Moira Concession cause more damage than is either necessary or cost effective. This statement could be applied anywhere in the Bolivian Oriente where logging is taking place. Commercial trees are felled without regard to the location of skid trails or the distribution of advanced regeneration (seedlings, poles, or small trees) of commercial species. Unfortunately, because directional felling is not practiced, before many of the logs can be skidded to log landings they must be rotated using the blade of the skidder. Because vines connecting the tree to be

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felled with neighboring trees are not cut prior to logging, trees not directly hit by the felled tree often suffer mechanical damage. Given the concessionaire's estimation of the proportion of hollow trees of commercial species (more than 50 percent), mechanical damage and subsequent attack by fungi, termites, and other wood-eating organisms represent a serious threat to long-term economic viability of timber harvesting. It should be pointed out, however, that the major factor contributing to this high proportion of hollow trees is probably fire.

Unnecessary damage to the forest and inefficient utilization of the trees felled is also due indirectly to the policy of assessing taxes outside of the forest. The policy makes it to the logger's distinct financial advantage to extract from the forest only the choicest logs. Substantial quantities of valuable timber are left to rot on the forest floor or at log landings. The policy component of the project will promote alternative revenue collecting alternatives and incentives such as technologies for adding value to wood not suitable for sale as sawn timber.

Forests damaged by logging in this manner are prone to fire and weed infestation. Logging slash on the forest floor constitutes fuel for the fires that apparently occur quite frequently in the Bajo Paragua area. The presence of numerous careless cigarette smokers and camp fires in the area increase the likelihood of ignition; the added fine fuels (logging slash) increase fire intensity. Canopy opening also promotes the proliferation of the already abundant vines. Once vines have come to dominate an area, tree regeneration may be postponed for decades. On the other hand, it should be pointed out that large canopy openings are apparently required for the successful regeneration of *Swietenia*.

One mitigating factor for logging in Bajo Paragua is the low stocking of currently marketable timber species. Although reliable data on stocking in the area are not available, it appears that on average, not more than one tree is extracted per hectare. On the basis of the logging damage model for Chimanes Forest Reserve presented by Gullison and Hardner, felling and extraction of 1 tree per hectare will result in about 20 percent of the forest being damaged. This estimate includes neither the potential effects of fire nor the subsequent proliferation of vines and other weeds that with time spread outward from areas directly affected during logging.

We anticipate that the intensity of logging in Bolivia will increase in the near future. Many tree species that are harvested in Brazil are currently not harvested in Bolivia, apparently due to higher transport costs. As markets expand and stocks of well-known and high-valued species are depleted, these other species will likely be harvested in Bolivia. Increased harvesting intensity will greatly increase logging damage, especially if current uncontrolled practices continue.

4.3 Eco-certification

To the extent possible the BOLFOR project will use market forces to motivate change from destructive to less destructive timber and non-timber forest product harvesting practices. One already significant and growing market force springs from worldwide concern for the

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continued existence of natural forests and the continued supply of forest products. This concern is being manifested in an increasing number of tropical timber boycotts and in the emerging "green" consumerism. The threat that their forest products will not have access to markets in environmentally concerned parts of the world in one reason for the widespread interest of Bolivian forest product exporters in "eco-certification." Pronouncements by the Bolivian government that all timber will be harvested in a sustainably before 1995 (Pausa Ecológica) and the International Timber Trade Organization's similar worldwide target for the year 2000 are contributing to the interest in eco-certification of Bolivian timber and timber products. Finally, at least some members of the Cámara Nacional Forestal and other forest managers see eco-certification as an attainable goal. Eco-certification also serves as an organizational theme for the BOLFOR project insofar as it incorporates forest protection, sustainable forest use, monitoring of the effects of forest management, and marketing of forest products.

Eco-certification programs are still developing but there is general consensus about the basic principles and criteria for forest management. Attainment of this consensus is in part due to the activities of the Forest Stewardship Council (FSC), an organization dedicated to monitoring and accrediting forestry certification programs worldwide. The principles of forest management endorsed and promoted by FSC and the eco-certification organizations that it represents are as follows:

FOREST STEWARDSHIP COUNCIL—PRINCIPLES OF FOREST MANAGEMENT
(Draft VI, October 1992)

Principle 1. Management Plan: A written management plan must exist which clearly states management objectives for each forest, the means for achieving these objectives, and provides for responses to changing ecological, social and economic circumstances.

Principle 2. Forest Security: The ownership of the forest must be clearly defined and documented, and management areas dedicated by the owners to permanent forest cover.

Principle 3. Social and Economic Benefits: Participating parties should receive an equitable share of the benefits arising from forest production activities.

Principle 4. Local Rights: The legal and/or customary rights of indigenous peoples and other long-settled forest-dependent communities affected by forestry activities must be protected, and forest management planning and implementation must provide for full and informed consent in relation to activities that affect them.

Principle 5. Environmental Impact: Forest management activities must have minimal adverse environmental impact in terms of wildlife, biodiversity, water resources, soils, and non-timber and timber resources.

Principle 6. Sustained Yield: Harvesting rates of forest products must be sustainable in the long-term future.

Principle 7. Maximizing the Forest's Economic Potential: Forest management should take into account the full range of forest products (timber and non-timber), and forest functions and services, and should maximize local value-added processing.

Principle 8. True Costs: The cost of forest products should reflect the full and true costs of forest management and production.

Principle 9. Appropriate Consumption: Forest production should encourage judicious and efficient use of forest products and timber species.

Principle 10. Tree Plantations: Plantations should not replace natural forest; they should explicitly augment, complement, and reduce pressures on existing natural forests.

Principle 11. Chain of Custody: The original sources and subsequent steps in the processing and supply chain must be documented to allow accurate product tracing.

The concordance between the FSC certification principles and the central theme of the BOLFOR project is nearly complete. The more detailed criteria and compliance guidelines of the certifying groups (e.g., Rainforest Alliance, or Green Cross Certification Company) will influence project-related forest management activities. BOLFOR sponsored researchers and foresters will work with representatives of the Bolivian forest product industry and an independent internationally accredited eco-certification group to develop management guidelines appropriate for Bolivian forests. Working towards the goal of eco-certification provides an independent evaluation of project performance and will financially benefit those companies, indigenous organizations, and other forest holders who satisfy the stated criteria and become eco-certified.

While there are a number of fairly substantial changes in forest-use practices that need to be made before eco-certification is a possibility, Bolivian forest managers are actually closer to this goal than are their colleagues in many other tropical countries. One major problem that BOLFOR will help to resolve is the lack of a scientific basis for forestry (e.g., growth and yield plots). To lead the world in compliance in ecologically and socially-sound natural forest management would be a boon to Bolivian forest and forest product industries and would unite environmentalists and industrialists with a common goal.

5.0 SITE SELECTION

5.1 Comparison of Sites

The Bajo Paragua in the Department of Santa Cruz was selected as the project's initial comprehensive site, which includes the Moira concession. During the screening process, a location in northeastern Santa Cruz Department was examined. This was Lomerio, an area of dry forest where the Chiquitano indigenous community has some 30,000 ha under management and has expressed interest in receiving training and technical assistance under BOLFOR.

Choice of a specific geographic area does not preclude the choice of other sites at a later date or the implementation of specific, targeted activities (e.g. applied research) at other sites early in the project. This site specific focus will allow the Project to explore in greater detail the potential impacts of project activities. Lessons learned during this process will help the implementation team to more precisely define subsequent assessment requirements as project activities are replicated or expanded into other areas of the Bolivian Oriente.

By choosing the two sites the possibility of analyzing others is constrained. However, the two sites are representative of a broad range of conditions. The sites offer the following range of conditions:

Moira	Lomerio
Large concessionaire	Organized indigenous community
Capital intensive	More labor intensive
Subtropical moist forest	Subtropical dry forest
Flat, soils from sandstone	Rolling, soils from granite
Fauna sporadically exploited	Fauna under constant pressure
Isolated from settlement	Amidst 32 settlements
600 km from Santa Cruz	<200 km from Santa Cruz

The sites are similar in that they are both on the Brazilian Shield and exhibit related soil/topographic constraints on commercial agricultural conversion. Both forests have been high-graded and subjected to sporadic burning. In this sense the forests are representative of millions of hectares of forest in Santa Cruz Department that are in need of ecological and economic rehabilitation. There is a real danger that such decapitalized forests will become eventual targets for conversion. These Pre-Cambrian shield forests do not represent forests found on better soils and under more humid conditions of the Andean front or Quaternary lowlands further east and north. Neither site represents "primary" forest (undisturbed, climax, virgin or primeval) in the Section 533(c)(3) sense. If the forests that more closely fit the primary forest conception are to be saved from the currently operative process of degradation, the project will need to establish a demonstration site in such forest.

5.2 The Moira Concession, Bajo Paraguá

The operations of this enterprise began in 1985 and are centered upon an industrial complex producing sawn timber and "oak" veneer for export. Species consumed are almost exclusively mahogany, cedar, and roble, although the industry recognizes other species expected to become merchantable after supplies of the three principal species become exhausted.

The visit included discussions with the plant manager, the company forester (a graduate from the forestry school in Cochabamba), and the civil engineer in charge of the veneer plant and sawmill. The plant and nursery were visited on the afternoon of the 17th of March. Forest operations in an area stated to have been first logged 10 years ago were visited on the morning of the 15th.

From a commercial point of view, the forest operations of this enterprise appear to be organized on a sound basis. Clearly, geographical isolation permits the company flexibility in its interpretation of the laws governing matters such as minimum cutting diameters (set at approximately 70 cm dbh). The function of the nursery with regard to the law requiring planting in logged areas is not clear. Sample plots established by the company to study natural regeneration were not visited. Line-planting of coffee on some sites was noted.

The company appears to work on an approximate cutting cycle of 10 years, consuming 6,000 logs per year. A sketchmap showing the areas logged since work began on the concession was stated to exist but was not seen.

Observations on the forest include:

- The sparse stocking of trees of commercial species and merchantable size. Apparently commercial harvests can be as low as two or three trees per hectare. That means that this forest remains operable only because of its easy topography and soils favorable for road construction and maintenance. Any silvicultural treatment in such forest should seek all means possible to increase the future stocking of commercially desirable species. This may be found to be a long-term goal, with limited prospects for interim yields, because of past unsustainable operations.

- Current logging operations appear to be competently managed and probably constitute an adequate model to develop. However, the absence of silvicultural treatment in conjunction with logging represents a failure to optimize possible productivity. Thus, opportunities for sustainability are lost, and have been lost since 1983.

- A high proportion of trees of commercial species appear to be characteristically malformed, to the extent that many logs, apparently acceptable, are rejected by the veneer plant because of inner wood tensions. The forester at Lomerío considers poor stem form to be a result of the competition for crown illumination while a tree is young and striving to gain its position in the forest canopy. If this proves to be the case, the incidence of poor stem form may be significantly reduced by silvicultural action. But, if it is found to have a genetic origin, it could be a considerable problem. This matter can best be decided by monitoring the stem form of young trees in silviculturally-treated plots. This could well be one of the priority matters for scientific observation.

- From a brief inspection of satellite photographs and field inspection, there appear to be some half a dozen forest types in Bajo Paraguá.

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Production Forest	Protection and Other Forest
High, dense	Periodically flooded
High, sparse	Sparse forest, shallow soil, arid, and rocky
High, periodically flooded	Sterile areas (rock outcrops etc)
	Areas more than usually susceptible to wind damage or forest fires

In the region of Bajo Paraguá, it is stated that forest fires arise both from grazing activities on the pampa lying within the forest and from lightning. Implications are that forest management will need to pay close attention to basic procedures for the control of forest fires, and to rapid access in particular.

The diversity in forest type implies the following:

- The effective forest area suitable for sustained industrial production comprises only a portion of the total concession area. A thorough mapping of the vegetation in the concession area, coupled with a forest inventory, will be required as a point of departure for management planning.

- The concession area is appropriate for multiple use; productive forestry, watershed protection, biological conservation, minor (non-wood) forest products, and ecotourism. A single road network would serve all purposes and, because the logging and silvicultural treatment are selective and occur on any given spot only once every ten to 20 years, and because forest canopy is preserved by concentrating silvicultural treatment upon selected individual trees, wildlife is free to move throughout the entire area. Different forest types would be used for different objectives, but fragmentation of the resource would not occur.

Among factors which could be expected to influence silvicultural treatment, the following were observed:

- The relatively arid conditions prevailing over a large part of the concession, especially during the dry season, suggest the importance of retaining the existing microclimate by not opening the forest canopy more than necessary.

- Natural regeneration of commercial species appears adequate to ensure sustainable operations. The fact that 30-40 percent of the area is shown to have natural regeneration only in the seedling stage implies: (1) a careful focussing of activities in order to bring a useful proportion of that population to maturity; (2) avoidance of logging damage, perhaps by ringbarking overmature and competing trees instead of felling them.

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5.3 Chiquitano Community, Lomerío

This forest appears more uniform and better drained than that of the Bajo Paraguá concession at Moira. It is stated to be 130,000 ha in area, of which 40,000 are estimated to be productive forest. Even though growth rates of trees in this region can be expected to be slow, this area should be sufficient for a sustainable operation.

The community operates a sawmill, producing wood for local construction, in particular a diocesan housing project. The community's forest produces mahogany, cedar, and oak. The presence of other suitable species gives rise to a forecast that it will become important to produce railroad ties. Because of an abundance of flowering species, the area is said to have considerable potential for honey production.

In general, the forest types at Lomerío are similar to those at Bajo Paraguá. The conspicuous difference lies in their management. The community, under the auspices of APCOB, and with the technical direction of the APCOB forester, Amado Olivera, has logged approximately 800 ha annually for the past three or four years and, since Olivera's attendance in 1992 at the CATIE intensive course in tropical forest management and silviculture, has applied in a routine fashion Timber Stand Improvement as well as the liberation of stems selected to produce future crops. This course of action places this community in advance of other technical forestry implemented in Bolivia, and in advance of much in Latin America.

Mr. Olivera operates his own program of technical training and, as a consequence, now works with a small group of competent forest workers and "técnicos." They apply the silvicultural treatment and assist, install and measure permanent sample plots.

Olivera is now managing planned annual cutting blocks which supply logs to the community sawmill. Simultaneously with logging, he optimizes future production by liberating stems selected to provide future commercial crops - by providing each selected tree with more growing space where necessary. It was observed that he would benefit from further technical assistance in this, particularly with regard to Timber Stand Improvement and the interpretation of data from his permanent sample plots.

Technical and vocational training based upon this forest resource, with the aim of incorporating interested members of the community in the operations of sustainable forestry and small wood industry, can be expected to lead substantially towards a higher standard of living for the community and an increased level of technicalization of its members.

At the moment, this community experiences difficulty in arranging to sell wood produced from its forest. This point was raised in conversation with officers of the Corporación de Desarrollo Forestal in Santa Cruz on 24th March. CDF undertook to improve the situation. Therefore, it is suggested that the community dedicate particular attention to producing non-wood products which may be sold free from government regulation, one of the most important and most easily mobilized being honey.

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During the course of the visit, it was observed that silvicultural treatment directed towards wood production acted sometimes against species, such as Curupaú, suitable for honey production. Therefore, it is suggested that management of the community's forests should designate areas to be managed for specific objectives, timber in some areas, and honey in others. In the areas designated to produce honey, silvicultural treatment would be modified to favor conspicuously-flowering trees over wood producers.

5.4 Chimanes Forest

The focus of this multi-faceted project is an economic and ecological analysis of selective harvesting of *Swietenia macrophylla* (mahogany) in the Bosque Chimanes portion of the Beni Biosphere Reserve. The project commenced in 1992 and is currently funded to continue until 1995. The research team is investigating the factors that influence mahogany regeneration and growth, using this information to develop management strategies, and estimating economic rents from different management strategies. They are addressing issues of biological sustainability as well as timber yields and plan to develop training course materials.

The "Chimanes" project has already greatly added to our knowledge of the economics and biology of mahogany harvesting. The investigators have collected data on prices, production costs, timber yields, and sawmill conversion efficiencies. They are using these data to assess the commercial viability of reduced harvesting intensity and forest management as opposed to uncontrolled harvesting. In regards to natural resources regulations, they are analyzing the relationship between current timber pricing policies and logging-caused environmental damage.

Studies conducted by the Chimanes project on stand structure, population biology of mahogany, and the effects of logging provide excellent baseline data with which other areas can be compared. The researchers have found very little mahogany regeneration away from recent river terraces and in large gaps. Their estimates of logging damage and their computer models for predicting the consequences of increased harvesting intensity both indicate that recommendations for increased harvesting of "lesser-known" species need to be made with care. At current harvesting intensities (0.12 trees/ha) the amount of damage to the Chimanes forest (4.39 percent) is extremely low but apparently increasing the timber volumes extracted will greatly increase logging damage.

The studies on mahogany being carried out in Bosque Chimanes are characterized by their excellent design and ample replication. They set a very high standard for other researchers in Bolivia. Furthermore, some of the designs developed in Bosque Chimanes should be replicated in other forests and with other species.

6.0 ACTIVITIES

The project supports sustainable logging and extraction of non-timber forest products with full knowledge that any intervention will result in some disruption of ecosystem

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functions and loss of biological diversity. However, the project is designed to have a markedly lower impact on natural system values in two distinct ways.

First, significantly increasing the economic value of the forest (and public awareness thereof) will result in:

- Those who control public or private forested land not in production reserves making the decision to manage the forest rather than convert it to other uses.

- Those who have concessions or use rights to production forests vigorously defending that economic resource against illegal intrusions.

Second, through research, training, demonstrations, and information dissemination the project will assist public sector institutions and forest based industries in defining and implementing forest management plans that meet the letter and spirit of national and international certification requirements.

An important element of the project is its high profile. Other countries, donor agencies, the scientific community, and NGOs are watching for results. The opportunity exists under the unique conditions prevailing in Bolivia to demonstrate sustainable management approaches for timber and non-timber forest products. The project will participate in several research and information exchange networks, publish results in the international literature, and create an integrated series of video-based training modules on forest management and related topics for pantropic distribution.

6.1 Forest Management Research

A central focus of the BOLFOR-sponsored research program is sustainable forest management.

Although the sequence of research projects to be conducted during the 7-year BOLFOR Project cannot yet be specified in detail, the topics of some of the initial investigations are clear. The major thrusts of the research program, however, will undoubtedly cover the following topics:

- Silvicultural benefits and economic costs of reduced impact logging techniques (e.g., directional felling and planned extraction).

- Costs and benefits of different stand improvement methods (e.g., liberation thinning and seed tree retention).

- Factors affecting forest product quality (e.g., stem form and wood properties).

- Biotic and abiotic factors affecting flowering, seed production and dispersal, seedling establishment and survival, and plant growth and yield.

One organizational scheme for the research component of the BOLFOR project is that while forest management techniques are necessarily site and species-specific, general silvicultural approaches and experimental methods are not. During the first two years of the BOLFOR Project, the research staff will design and implement field studies that will serve as models for later in the project, elsewhere in Bolivia, and concerning other species.

The foundation for much of the forest management research to be conducted will be permanent plots in which the establishment, growth, and commercial product yield of selected species can be monitored. Given the substantial progress made in the Chimanes Forest, BOLFOR researchers will carefully consider employing the same basic plot layout. This consists of 100 ha study sites in which ten 1 ha (20 x 500 m) plots are installed for more intensive studies. (Long rectangular plots capture more variance due to environmental heterogeneity than other plot shapes). Within the 1 ha plots and subplots thereof, trees will be permanently marked with numbered tags, identified to species, mapped, measured, and described in terms of crown and bole characteristics. Study sites will be selected in logged areas, areas to be logged, and control areas. Logging will be carried out in the conventional way or by following felling and extraction guidelines developed by the Project. Post-felling silvicultural treatments will also be tested in the plots.

Given the range of environmental conditions in Bolivia, the diversity of species for which forests are to be managed, and the variety of forest user groups, the BOLFOR Project will conduct forestry research in several different locations. Initially research will be carried out in the Chiquitano Community Forest (Lomeria) and the Moira Concession in Bajo Paragua Forest Reserve. Permanent plots in these two areas should be established during the first year of the project. During this period BOLFOR staff will locate research and demonstration sites in one or two Centros Regionales de Investigaciones in Santa Cruz Department. The possibility of initiating research in forests controlled by groups other than large concessionaires or indigenous communities (e.g., forest colonists or ranch owners) will also be investigated.

It is imperative that model silvicultural investigations be initiated during the early phases of the BOLFOR project in parallel with the planned ecological studies described below. Silviculture studies will therefore be carried out primarily on the 3 tree species with commercial potential currently extracted. These studies will be coordinated by the project's forest ecologist and forester, carried out primarily by Bolivian researchers affiliated with the project, and monitored by the project's social scientist and wildlife biologist. Studies to be conducted will concern the effects of different harvesting and stand improvement treatments on the stocking, growth, and yield of these species. Simultaneously, the effects of these treatments on non-target organisms and ecosystem processes will also be investigated.

An example of the type of multi-disciplinary applied forest management research to be conducted concerns the effects of removal of large defective trees on growth of potential crop trees and the associated effects on psittacines (parrots and their relatives). The

motivation for this research includes the conflict between the potential silvicultural benefits of removal of trees that will never be harvestable for timber and the potential benefits of retention of these trees as seed sources as well as their wildlife value. With the appropriate controls and organization, the latter value could be converted into actual income for forest mangers from the sale of psittacines. Recent studies conducted elsewhere in Latin America have indicated that populations of psittacines and other hole nesting birds can be increased by providing nesting cavities and that young birds can be harvested in a sustainable and lucrative manner.

Other silvicultural techniques to be tested during the first phase of the Project are related to reducing the impacts of logging and increasing post-logging forest regeneration rates. Directional felling and different log extraction methods will be tested in the experimental plots. Studies on regeneration enhancement will include removing competition around selected potential crop trees (liberation thinning) and enrichment planting. Both stand improvement methods have been shown to be effective under specific environmental, social, and economic conditions but there is little first hand experience with either in Bolivia.

Research on weed and fire control methods will also commence in the early phases of the BOLFOR Project. Woody vines, in particular, appear to suppress tree regeneration after selective logging in the wetter areas of Bajo Paragua. Experiments will be conducted on the effectiveness of pre- and post-felling vine cutting in the permanent plots; felling damage, vine infestation frequencies, and tree growth rates will be monitored. Basic studies on fire ecology will be complimented with investigations of fire control methods.

6.2 Vegetation Mapping and Resource Inventory

Planning of sustainable forest management operations cannot proceed rationally until accurate base maps are prepared and inventory data collected and plotted. Mapping of vegetation types and more detailed maps of stand data for timber and non-timber forest products will be conducted with the aid of false-color infrared aerial photographs. Satellite imagery will be used for broad-scale mapping. Selection of stand inventory techniques will be based on preliminary sampling conducted during the earliest phase of the BOLFOR project. Mapping will be coordinated by the MDS and the aerial photographs taken by FAN.

6.3 Forest Engineering

The goal for this project component will be to develop cost-effective and ecologically acceptable road construction methods. Particular attention will be paid to stream crossings and roads that traverse wetlands. The forester will make use of short-term technical assistants and will coordinate forest engineering operations with research on the environmental effects of logging (e.g., studies on stream sediment loads and aquatic invertebrates).

6.4 Timber Harvesting

Minimizing the environmental damage associated with logging, particularly damage to potential crop trees, is a main project emphasis. The forester will participate in research on different felling and extraction methods and will conduct training courses on these topics for field workers.

6.5 Stand Improvement Methods

Techniques for increasing the stocking and growth of commercially valuable species will be developed. Methods of various intensity and cost, ranging from enrichment planting along cleared lines to liberation of selected potential crop trees from competition will be tested. Growth and yield responses will be monitored in permanent plots. Particular attention will be paid to timber quality because of apparent problems with the mechanical properties of wood derived from some forests.

The research on timber stand improvement upon which silvicultural prescription and forest management plans will be based will be conducted in 100 ha forest blocks. Initially the research will be carried out in Bajo Paragua with more limited efforts in the Chiquitano Community Forest. It is envisioned, however, that additional research plots will be established elsewhere in Bolivia, emphasizing different species, and in forests controlled by various user groups.

7.0 IMPLEMENTATION SCHEDULE

Phase I (First 12 to 18 Months)

The project implementation will begin in July of 1993, at the peak of the dry season timber harvesting period. It can be assumed that the first two months will be largely spent setting up offices, establishing working relations with counterparts, and assembling supplies and equipment.

Research. Data gathering in support of hypothesis testing for priority topics will begin during the first two to four months and continue into the second year. Examples include:

- Sites for field testing of forest management strategies for timber and non-timber products can be identified. Data on plant, animal and system impacts will be gathered to compare with controls.

Training. Much of the training during Phase I will involve training in research methodology and followed by learning while carrying out research. Research leading to the engineer degree or its equivalent will be focused on problems relevant to the project under close supervision of national and visiting experts.

By the end of six months the first contingent of Masters degree candidates will have been awarded fellowships for study abroad. These first BOLFOR Fellows will return in 12 to 18 months to begin thesis research on problems identified by the project. A Third of these Fellows will be in forestry.

Phase II (18 to 36 months)

The most dramatic addition to project activities during Phase II will the launching of demonstration and site-specific training activities.

Research. Research begun during Phase I will continue and new work initiated as needs for information are identified. The capacity of Bolivian institutions to carry out this research should be enhanced by the return flow of trained professional returning from graduate studies abroad. Examples include growth and yield measures and succession following silvicultural treatment studies.

Toward the end of Phase II it is expected that activities being carried out in Santa Cruz Department will be replicated in other parts of the Bolivian Oriente. This will necessitate replication of some protection as well as production-oriented research in new ecological settings. Support for some of this research will begin early in the project, for example, continuing support for the work underway in the Bosque Chimanes.

Demonstration and training. Early activities will emphasize discrete themes (directional felling, extraction, etc.) certain to contribute to lower impact logging. However, by the end of Phase II it is anticipated that commercial scale demonstrations of logging and non-timber forest product extraction with cooperating forest managers will be underway.

Demonstrations will be complemented by an integrated sustainable forestry curriculum. Each module will be free standing, but will contribute to an integrated package. Modules will be designed to be conducted in the field with an emphasis on learning by doing. The first field testing of the training module will be filmed by a professional videographer and a 45 minute video created to be used as an integral part of future courses and as a training film available to sustainable forestry teachers and practitioners.

The core curriculum can be divided into three component parts each with its set of training modules. These are listed below:

<u>Tropical Forest Management</u>

- Forest inventory and mensuration techniques
- Research methods in forestry and forest ecology
- Selection of management strategies
- Timber felling and extraction road construction
- Preparation of a forest management plan
- Assessment and monitoring for certification and EAs

Forest Product Utilization

- Milling—chainsaw, portable and conventional
- Wood technology and wood working
- Drying and finish milling
- Value added processing techniques

Forest Product Marketing

- Marketing organization and quality control
- Matching of markets with products and skills
- Business management

Phase III (36 months to End of Project)

By the beginning of Phase III the project should have a good idea of what sustainable forest management looks like under specific site conditions in Bolivia. By this time the Pausa Ecológica and European Community deadlines for certification of sustainability of management will have passed. A broad spectrum of the forest products industry should be ready to accept and apply sustainable management techniques.

Research. Much of the research will be dedicated to refinement of knowledge about sustainable management and continued monitoring of activities.

Demonstration and training. Wide dissemination and replication of sustainable forest management will be the primary objective of Phase III. Achievement of success will depend on major participation of Bolivians in the process. Training of trainers will be necessary.

ANNEX D1c
TIMBER PRODUCTS

1.0 TRADE OVERVIEW

Bolivian wood producers pride themselves in practicing some of the most selective extraction of any tropical timber producing area. The main lumber species in trade, both domestic and export, is Mara (Mahogany, Swietenia macrophylla) which is reported to account for over 70 percent of the total[1]. The next most important species in trade are Roble Cerejeira (Amburana cearensis) reported to account for 22 percent of total exports, and Cedro (Cedrela sp.), accounting for 3 percent of exports. The three species combined account for a reported 97 percent of the export of rough sawn lumber, which itself is the largest single classification of wood exports amounting to almost 81 percent of the total of such exports. The main additional specie in trade is Cerebo (also referred to as Sebo) which is used primarily to make plywood. Plywood exports represent approximately 10 percent of total export value. Veneer exports, dominated by Roble (57 percent), Morado (27 percent) and Mara (9 percent) account for approximately 4.5 percent of the total export value.

Historically, most export trade has centered on a few high value rough sawn species. The main, almost universally accepted, reason for this concentration seems to be the relatively high cost to transport the wood to the export point (i.e., ocean port or national border). Most exports to the United States and Europe go mainly through the port of Arica, Chile. Industry representatives from the Santa Cruz area, as well as transportation companies, all indicate the inland cost of transportation from Santa Cruz to Arica at approximately $200 per 1,000 board feet ($85 per cubic meter). As a comparison, the cost to move the wood from Arica to U.S. East and Gulf Coast ports is approximately $140 per 1,000 board feet ($60 per cubic meter). Exports going primarily to Argentina, another major export market, and Brazil, must be transported by a very long and relatively expensive railroad line.

The commercial pressures concentrated on a very limited number of species may be viewed by some as positive, in that much of the other timber in the forest is not harvested. However, the concentration on only a few species can threaten the future of those species, as well as any other dependant life forms. The fact that the remaining species are of little or no commercial value offers no incentive to the concessionaire to protect the remaining forest from encroachment by farmers. In many instances the farmers clear the remaining forests to claim title to the land, and in many cases farm it or use it for cattle ranching.

Two key components that can lessen the pressure on the forests and in particular on the stands of the relatively few commercially valuable species, and give financial incentives

[1] Cámara Nacional Forestal Statistics, see Appendix 1.

to the concessionaires to protect the forests, are greater utilization of the trees currently being cut and the use of other species to generate economic value.

2.0 CURRENT ECONOMICS

The most recent compilation of prices and costs is the "Timber Pricing and Forest Concession Management Policies: The Case of Bolivia"[2] study. Another good reference for costs in the "Report on Commercial Aspects of Forest Management in the Bosque Experimental Elias Meneses."[3] Much of the statistical cost information contained in both reports appears to be close to values quoted by industry representatives visited in March 1993. Some of the FOB Arica prices previously reported are now a bit low, compared to today's values. In general, due partially to the log shortages caused by the heavy rains experienced this past season, producers are asking for higher prices for this coming season (April-December 1993). While this expectation may be reasonable for the domestic market, it is not necessarily true for the export market.

According to cost studies and industry sources consulted in March 1993, the main profit for exports lies in high value species, mainly Mara (in rough sawn lumber) and Roble (in veneer). Current prices for Mara (mahogany) lumber, in number one common and better grade (#1C & BTR), freshly sawn, are approximately $1,400 per 1,000 board feet ($594 per cubic meter) FOB Arica. Based on current cost estimates this selling price should yield operating profit margins of approximately 40 to 50 percent for logging and sawing. These margins are high. Because of these high margins and the relative lack of substantial capacity to further process, some have mistakenly suggested that exporters should be allowed to concentrate their efforts in exporting raw materials. The exporters currently seem to enjoy the best rate of return on their investments when they export rough sawn lumber and could enjoy equal or better rates of return on log exports. The main reason for this situation lies in the low cost of stumpage fees and the relative lack of efficient capacity to further process, in sufficient volumes, high quality products to meet export market demands. This situation can be changed and the exporters can be shown acceptable rates of return in further processing, both of the current wood cut and through use of lesser valued, more abundant species.

Current world demand for Mara is relatively low. During 1992 the producers in the three major Mahogany supplying countries, Brazil, Bolivia and Peru, shipped lower volumes than they did in 1991. In part this appears to be a function of supply, as the producers in both Bolivia and Peru suffered severe weather conditions which limited their harvest. The Brazilian producers mainly suffered from poor market conditions in the consuming countries caused by a combination of both poor general economic conditions and manufacturers/end users' concerns about salability of their finished products, raised by tropical timber boycott campaigns waged by preservationist groups.

[2] Study by R. Stewart, V. Molinos, H. Claure, and D. Gibson.

[3] 1991 study done by Geoffrey Pleydell under assignment from the Overseas Development Administration.

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In 1992, certain preservationist groups targeted mahogany in Europe and the United States at the biannual Convention on International Trade in Endangered Species (CITES) meetings in Kyoto, Japan. During the 1992 CITES meetings actions were taken, without scientific basis, to attempt to have mahogany (Swietenia macrophylla) listed on the CITES list as either a threatened specie or an endangered specie. A threatened specie listing permits continued trade, but requires much more reporting and paperwork. These restrictions will reduce the value received by the producers in the supplying countries. An endangered listing would only allow trade that can be certified as having been made from logs which were cut previous to the species listing. This would virtually eliminate any trade in mahogany (Swietenia macrophylla) within a year of its listing.

Fortunately, mahogany (Swietenia macrophylla) was not listed. Any future CITES listing of mahogany (Swietenia macrophylla) will destroy most market potential for any products made from this specie and result in severe damage to the economies of the three major producing countries as well as a number of smaller Central American countries that are beginning to exploit their forest resources.

3.0 REVIEW OF CURRENT PRODUCTION CAPACITIES

The major current industrial capacity for wood processing in Bolivia is logging and sawing of the logs into timber. There are currently a few installations slicing logs into veneer (thin sheets of wood, usually less than 6 mm thick) and a number manufacturing plywood and particleboard. All other categories of products, individually, account for less than a few hundred thousand dollars annually. However, these other product areas offer some of the best promise for future industrialization, employment, increased utilization, and economic gain.

For the purpose of this paper the industry is divided into the three main categories. The first category is the medium to large size industries where most previous studies have concentrated. The companies in this industry segment quite often are either directly in the logging and processing of the logs (saw milling, veneer slicing, plywood manufacture and particleboard manufacture) or related to a company that is in one of these areas of business. Companies in this category generally have fairly modern equipment and many have fairly substantial investments in plant and equipment. Most of these companies have realized the importance of concentrating their efforts in a fairly well focussed (and limited) product area. Many companies of this size are financially secure and willing to make additional investments, where these can generate acceptable economic returns.

The companies in this grouping account for the largest direct effect on the forests and in the export markets. Many of these companies are also the industry sales leaders in the domestic market. Because of their important role in the market, this study focuses on members of this segment.

Many producers in this segment are fairly well financed and appear to be willing and able to make additional investments in other profitable areas. This project has a great

opportunity to have a positive effect on most of the major timber extractors and processors, with costs mainly to educate them.

The second category of industry is the small industries. The companies in this sector can be generally classified as small shops with a limited number of employees. Most of these shops have some machinery, but certainly not the most modern or efficient equipment. The companies in this group usually buy their raw materials in the open market (quite often from local warehouses and lumber yards owned by companies in the first category). They have the domestic market as their target customers. Most of these companies make any product they can sell and therefore have not benefitted from specialization or some of the basic industrialization benefits.

The third category is the artisans. This category has the smallest work force; most are either one man shops or cooperatives where a few artisans share work space or some equipment. Companies in this category usually sell their work domestically, but some have found good export markets as far away as Europe. While this area of industry may be the smallest, it also offers some of the best opportunities for indigenous crafts people to earn a living.

4.0 DIFFERENCES BETWEEN NEW SUGGESTED PROGRAM AND EXISTING PROGRAMS

The program being run by Carana Corporation combines export and foreign investment promotion in Bolivia (their Bolinvest Program). While this program has concentrated on providing technical assistance to manufacturers, their main emphasis in the United States is the Bolinvest Program. The main efforts at marketing appear to have been attempts to market existing products (products already being made by Bolivian producers). There does not seem to have been any consideration of the environmental effects of any product promotion nor of educating the Bolivian producers of the great market opportunities for alternative products that exist.

The biggest difference between the existing export promotion program and the market information section of this program involves the creation of new manufacturing capabilities to better utilize currently available wood as well as nontraditional species. The knowledge of what the market demands and can use can be invaluable in advising the producers of what new products to produce.

For example, the Mara which is exported from Bolivia is usually specified to be in 6 inch and wider x 8 ft and longer boards. While preparing the export specification from the lumber, most mills will develop as much as 30 percent of their total available material in specifications that do not meet either the export quality or size (e.g., "shorts") requirements. This material can be processed into furniture dimension parts and allows the producer to recover much more value from each log and reduces the need to cut down as many trees. In order to be able to produce the dimension lumber the producers will have to add capacity to dry the lumber and accurately cut the pieces to size.

Another use for the shorts involves gluing them together to make wider and longer planks which are used in the model and foundry business. While these glued up planks use the shorter and narrower material, they actually sell for as much as 50 percent higher prices than the normal export specification lumber and 200-300 percent higher value than the short narrow stock.

The same equipment used to make the glued-up Mara planks can be used to make effective use of one of the the most prevalent species available, Balsa (Ochroma pyramidale). Balsa is the first tree to regrow in formerly degraded areas after the farmers leave. The tree is considered harvestable within five to six years. The FOB Arica value of kiln dried Balsa lumber is approximately $700 per 1,000 board feet. This price should yield a profit margin of approximately 25 percent. However, when the Balsa is glued into large panels and planks, the FOB value can increase by as much as 50 percent, with an estimated potential profit margin of 32 percent.

One additional positive aspect of using species such as Balsa is that the seeds can be very easily planted and the trees can be harvested relatively quickly. The trees have such dynamic growth rates that they can serve as a living model of the benefits of reforestation.

Just as the Balsa specie can be used to provide additional value to the forest products sector, many of the other available species can also be processed and made valuable enough to cover the high transportation costs of export.

One of the most difficult problems encountered when trying to determine uses for less known species is learning about the availability and the technical qualities of the wood. Using the availability information, it is possible to select the lesser known species that would be available in commercial quantities, determine their role in the forest, and, when satisfied that they are safe to use, publish information on the technical aspects of the specie and on suggested uses. While some of the technical information may have to be developed, much is already available through various sources. Many of the lesser known Bolivian species are present in neighboring countries. Some of these countries have already studied the species and developed the technical data. Some of the studies have been done under the International Tropical Timber Organization (ITTO), which has published this information and made it readily available.

The most abundant species throughout Bolivia is Ochoo (Hura crepitans). Much has been reported previously about this species in Bolivia, most reports calling it a low value lumber species and dismissing it as a potential export specie. ITTO has published a four-page brochure on this specie. The specie is quite prevalent in both Brazil, where it is known as Acacu, and in Peru, where it is know as Catahua. This specie may have a fairly low value as a lumber, approximately $400 per 1,000 board feet ($170 cubic meter), FOB Arica. However, the specie's value can increase dramatically when kiln dried and run into long moldings. Long moldings currently can be valued at between $900 and $1,300 per 1,000 board feet ($382-$551 per cubic meter).

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5.0 MARKET INFORMATION PROGRAM PROPOSAL

The project should employ a market expert who is currently dealing in the imported wood products field to show the producers what additional products the market will buy as well as to provide information on general manufacturing procedures.

Advisory service will be provided to the Bolivian wood and wood products industry in quality standards, quality control, design, manufacture, finishing, packaging, and marketing techniques. Wherever more technical assistance is needed, specialized technical experts can be used.

5.1 Activities

Under the direction of the market expert the project will provide advisory services to the Bolivian industry in various areas, as described below, to enable them to plan, produce, and market products for the international markets.

A market analysis will be conducted to provide information on marketable products. The analysis will be based on the available raw materials, existing production facilities, and potential expanded facilities. The research will be done from a business perspective using existing, new, or future end-user contacts. Sourcing agreements with various wood products manufacturers and marketers in the United States and Europe will be developed.

The project will identify potential marketable products from the residual materials from current saw milling activity and develop additional markets for nontraditional species that are readily available. It will also identify higher value-added products to make better use of available materials and provide more employment.

The project will teach the Bolivian producers about international quality standards for rough lumber and lumber products, by retaining the services of professional instructors to teach the prospective producers the applicable grading standards. The education can be done through the appropriate associations in Bolivia, such as Camara Nacional Forestal. Obtaining the additional expertise will strengthen the associations as well as benefit their members.

The type of training will include specific product quality standards training. For example, an expert from the National Hardwood Lumber Association (NHLA) will teach hardwood lumber producers. This group is the main organization for sawn lumber standards. The expert will explain the quality standards and can train Bolivian citizens to grade the lumber being produced. For wood products such as moldings an expert from the International Hardwood Lumber Association (IHPA), the group that developed the quality standards for lumber products, will be used.

The project will provide assistance with all production aspects of higher value-added products such as furniture. The assistance will be in product design, manufacture, finishing,

packaging, and shipping. Experts will train Bolivian producers in modern production methods and to conduct quality control training.

For the smaller industries which do not have the financial resources to install some of the additional capacity needed to upgrade their production, the Project should consider helping an appropriate entrepreneur to establish required custom services, such as lumber drying. One of the areas that needs immediate attention is the ability to properly dry wood, prior to processing it beyond rough sawn lumber.

5.2 Inputs

To accomplish the above objectives, the following personnel will be needed:

Market Expert. This person should be based in the United States, to remain current on market information, but should plan to travel to Bolivia at least once every two to three months. The market expert will eventually have to travel to other potential consumer markets once Bolivian producers are capable of producing more export quality products. This person must have overall wood products market experience and knowledge. Preferably, this person should be someone with recent import hardwood products experience. This expert must also have good contacts both in the manufacturing and marketing segments of the business, to be able to obtain the cooperation of the necessary additional experts needed. As this expert will have overall oversight responsibilities, he will be retained for the life of the project.

Short-term Experts. These professionals will be used on an as needed basis.

The lumber grading instructor would probably need at least two weeks to give a short course of instruction. The short course would cover the basics of grading and would be very helpful for both management and employees in furthering their knowledge of the international hardwood trade. For a more thorough understanding of and ability to grade, the NHLA has a school in Memphis, Tennessee, to train graders. The full training course lasts 14 weeks. The cost is $1,000 per person, not including living accommodations.

The lumber products grading instructor would be a business person, possibly the writer, who is using the quality standards in their day to day business. The IHPA does not have a formal training school or employee qualified to do the instruction. The lumber products grading can be incorporated into the work of the market expert, if the market expert has the necessary knowledge and experience.

The product design, manufacture, finishing, packaging, and shipping instruction will be provided as specific products are identified as in demand by the market places. For the initial design work, the focus will be on producing products to buyers' specification. This will reduce or eliminate the possibility of investment in product design and manufacture, without assured markets for the products. Experienced production professionals will be brought in to show the Bolivian manufacturers how to make the most of their raw materials and how to most efficiently produce their products. This will be done on a one to one basis.

Initially, the efforts will be concentrated on a few manufacturers, which can be used as examples for the balance of the industry to see. The initial need will be for at least one production expert, who will spend as much as six months redesigning the factory layouts, product flows, and teaching the workers how to produce the products.

Seminars and workshops should be held in each producing city to explain quality standards of the international markets as well as particular product standards. The seminars should be scheduled for approximately one week in each main city, once a year.

In addition to the training in country and the possibility of U.S. training of the lumber graders, consumer country visits will be used to further educate the producers, after they have demonstrated their willingness and desire to dedicate themselves to improving their production. The consumer country visits would probably be in the form of a trade delegation, initially visiting the United States, some time towards the end of the first year of the program. During the second and subsequent program years, producers may actually participate in trade shows in the consuming countries. For example IHPA holds an annual convention where its members, who account for more than 75 percent of the U.S. imported wood product flows, meet. The IHPA offers an opportunity for potential exporters to meet the most important U.S. importers in one location. IHPA offers the opportunity to have a full display at alternating conventions (generally the ones held in even number years). IHPA's charge for this participation and display area normally ranges from $6,000 to $12,000, depending on size of the display booth and the number of participants.

The project may want to assist the industry by enabling an entrepreneur to establish a customer lumber drying business. The costs for such a facility would include the equipment, installation, and working capital. The costs would be approximately $85,000 for an oil fired unit and up to $125,000 for a wood waste fired unit. The approximate capacity of the facility would be 30,000 board feet (70 cubic meters) per charge. With predrying, one should be able to obtain an average kiln drying cycle of approximately 10 days. Therefore one million board feet (2,560 cubic meters per year) could be dried with the facility. The facility could be designed to dry as much as two thirds more lumber for an approximate additional cost of $35,000. The largest manufacturer of this equipment, based in the United States, charges 35 percent of the equipment value for installation and initial training.

Most of the additional equipment, which would be needed by the larger industry members, can relatively easily be paid for by the companies in need.

U.S. companies import a total of approximately $3.5 billion dollars annually of hardwoods and hardwood products. Approximately $2.2 billion is in furniture. Of the remaining $1.3 billion, more than 80 percent is in value added wood products. Bolivian producers currently enjoy an extremely small percentage of the total market, with most of their product falling in the smaller part of the market, rough sawn lumber, primarily mahogany. The market information and education program, combined with education and promotion in the consuming markets, could greatly increase Bolivia's income from the forest products sector, especially in the value added product areas and furniture. This will generate

more cash for employment, better natural resource management, and additional investment in the country.

It is possible that the project could increase the value of Bolivia's forest products sector, while providing sufficient incentives to the producers to better manage and protect their forests resources. An increase in the value of the forest products sector earnings of at least ten percent by the end of the first full year of the program's operations, with increasing continual improvements in the succeeding years, is possible.

6.0 SPECIAL NOTES

1. While there currently exists a trade promotion program, run by the Carana Corporation, the project would not duplicate their efforts. Carana's efforts have centered mainly on seeking foreign investment in Bolivia and to a much smaller extent promoting export of products already being made in Bolivia. These products may include some timber items, but they have worked to promote what is currently being made, not to educate producers as to market demands and then market the resultant products made to market specifications.

2. One other area that does not have a current marketable potential but which may have in the future is the idea that products produced through more environmentally friendly means should command a price premium. While the public, when questioned, overwhelmingly responds favorably to paying more for a more environmentally friendly product, they do not do so, in the actual market place. This may change in the future. If this situation does change, it must be taken advantage of.

NON TIMBER FOREST PRODUCTS

1.0 INTRODUCTION AND BACKGROUND

Economics drives much of the world's rain forest destruction. Local people clear forests to raise cattle, grow crops, log timber, mine precious materials or pursue industrial development. The BOLFOR project seeks alternatives to destructive land use practices by creating viable economic endeavors which are consistent with the maintenance of fragile ecological systems and appropriately sustain local residents. These solutions include products and services which depend on the sustainable management of natural resources. Products include timber and timber products and numerous non-timber species which, when properly managed, can be used year after year with little damage to the ecosystem. A healthy forest system also allows for income-generating opportunities in the service sector such as ecotourism and biological research stations. Marketing forest products and services can help local people earn their living by managing and harvesting biologically rich forests instead of destroying them for short-term gain.

Secondary forest products have a multitude of uses, and generally form the sustenance of traditional forest communities. These products, which include nuts, fruits, fibers, resins, oils, and waxes, are used in medicinals, foods, cosmetics, rituals, building materials, and

artisanry. Moreover, the intact forest has aesthetic and spiritual values which are both worthy in their own right and offer opportunities for livelihood through ecological and alternative tourism.

The diversity of non-timber forest products (NTFPs) can be segmented by their uses and by their consumers. Products may be consumed at the household level or commercialized in local, national or international markets. The consumption value of NTFPs is often overlooked because there is no formal means for recording their importance to household income and these products are not counted as part of the gross national product. However, policy makers should recognize the importance of NTFPs in sustaining traditional peoples and the link between the ability of local people to use the forest to meet their basic needs and the desire to conserve the forest as a resource. Moreover, if forest products and services are disturbed, rural populations will be forced to seek other methods of survival which may involve destructive use of the remaining forest or migration to the cities, compounding the problems of urban poverty. Thus, this project should seek to promote the rational use of consumption products, such as nuts and fruits for food, palm leaves for roof thatching, plant extracts for local medicinal remedies, as well as develop markets at the national and international levels. While the product development component of the project will seek to commercialize goods and services from the forest, the research and training component should focus some of its efforts on improving the management of the species which are used most intensively for local consumption.

Whether products are used for local consumption or marketed, some common principles should be followed. Products should be extracted on a sustainable basis and this requires a thorough understanding of the biology of the particular plant that is harvested as well as an understanding of the role the plant plays within the ecosystem as a whole. Intensive harvesting of a single species could disrupt a complex food chain of other species as well as undermine the long-term health of the target species. Harvesting and marketing NTFPs must also be considered from a socio-economic perspective. Local collectors and producers must earn sufficient wages to properly manage the resource and be trained in management techniques. A harvesting operation that relies on "cheap labor" may force workers to intensively hunt and log the forest while they are ostensibly "sustainably harvesting" a particular product. The production system must be appropriate to the local culture to foster a long-term positive approach. Finally, an NTFP program must be economically viable for each player in the production and marketing chain. Subsidized programs create dependent relationships and will end when sources of funds disappear. Determining the economic viability of a NTFP venture is particularly difficult because markets may be new and difficult to estimate, transportation may be unreliable, appropriate technology may not be developed and capital may be limited.

NTFP projects can be powerful demonstrations of the importance of sound natural resource management. The influence of these projects is increased if they are linked to more comprehensive conservation schemes, such as overall land management plans and the relation of projects in buffer zones to the protection of core areas. Commercialization of given products or services may not necessarily lead to conservation, especially in the face of economically more attractive destructive land use practices. Utilization and

commercialization of NTFPs must be linked with education, training, planning and enforcement schemes to be particularly successful.

2.0 BASIC CONCLUSIONS ABOUT MARKETING NTFPs IN BOLIVIA

2.1 Status

The commercialization of non-timber forest products provides important sources of income and foreign exchange for numerous tropical countries. Notable examples include Rattan, which earned Indonesia $194 million in 1988 exports (Manokaran, 1990 as reported in Smith 1992), Brazil Nuts, with the world market estimated to be $33 million annually, and in Guatemala three extractive products (chicle, allspice, and xate) represented exports of $1.75 million, $.55 million, and $3.4 million respectively in 1990. These products not only represent significant sources of foreign exchange for the country but are often vital to the livelihood of entire forest communities.

In Bolivia, the three major NTFPs exported in 1989 were Brazil Nuts ($10.2 million), Natural Rubber ($1.3 million) and palm hearts ($.3 million). These three products represented approximately 6 percent of nontraditional exports in 1989 (World Bank reports). Between 1989 and 1991 Brazil nut exports grew by 8.8 percent, palm heart exports grew by 128 percent, and rubber exports declined by 18.6 percent. While the current export of non-timber forest products from Bolivia is a relatively small percentage of total trade, these three products are an extremely important source of income for thousands of people whose livelihood depends on forest extraction.

There appears to be significant commercial potential for expanding the harvesting and marketing of non-timber forest products in Bolivia. There are likely opportunities to grow the markets for the three major products discussed above by improving quality control, introducing new production technologies, assuring adequate management of the resource, and strengthening marketing programs. In addition, there are other NTFPs which grow abundantly in Bolivia which are not currently exported. Several of these products are commercialized in neighboring countries and may offer potential for Bolivia. Cusi oil (derived from the *Orbignya phalerata*), palms grow in vast stands in Bolivia but very little is commercialized. The same palm in Brazil, known as Babassu, produced 70,000 metric tons of oil for domestic consumption in 1986 and several efforts are underway to build export markets in Babassu products. A brief analysis of palm hearts, cusi oil, and Brazil nuts are included in the appendices at the end of this annex.

The potential for developing new NTFPs from Bolivia is also promising, though quite difficult. Bolivia is very rich in biodiversity and still retains large tracts of intact forest, thus offering a wide variety of products to explore. The indigenous and campesino populations use a wide variety of products for household consumption even though the exports of NTFPs has been limited to the three major products. Several potential products, in particular palm products, occur naturally in large concentrated forest stands. The *Orbignya phalerata* (Cusi) and *Euterpe edulis* (palmito) palms, for example, occur in large natural stands in Santa Cruz

and this concentration may enable these products to be extracted in a commercially viable manner. Numerous other palms may also have commercial potential.

Despite these possibilities, there are several constraints to successful sustainable exploitation of NTFPs. A product must be harvested in a proper way, the socio-economic impact of the extraction must be positive, the product must be competitive in terms of cost and quality on the world market, and there must be sufficient supply and demand to make ventures worthwhile. These requirements are difficult to meet particularly in Bolivia which faces poorly developed infrastructure, high costs of transportation, underdeveloped technology, and an international reputation for poor product quality, at least in some sectors. These limitations are not insurmountable, but they do suggest that certain high potential products should be targeted for development so that sufficient focus and resources are brought to bear to make a product development effort successful and worthwhile. The overall market potential, and the level of local benefits, will need to be key criteria in selecting new products to develop.

One subset of the NTFP market is the use of non-timber resources for artisanry. In Santa Cruz, for example, CIDAC is selling artisanry work from seven indigenous groups in the region and three of the products are based on forest products. They include a wild pineapple fiber used for bags, a "tree cotton" used for weavings, and jipijapa, a palm fiber used for "Panama" hats. While most artisanry projects are seen as too small and the markets too fragmented to seek exports, some of these products may have a significant potential at the community level. At the national level, the Popular Culture Museum is planning to create an export company to market arts and crafts from around the country. They also are eager about possible exhibits which explore the relationship between artisanry and the environment.

The Bolfor project should maintain contact with these and other organizations marketing handicrafts produced from NTFPs. Possible collaboration could include management plans for those resources which are being over-exploited and technical assistance in marketing and enterprise development, though this area will most likely be a lower priority for the project. Another possibility is that the Research and Training component may choose to study those plant species most important for the artisanry sector.

There is a recent surge of activity and investment in the NTFP sector in Bolivia. Some of the major projects include significant collection and identification efforts on the part of the national and international herbariums and botanical gardens, including pending contracts to collect plants for medical research, an intensive agro-ecological zoning project of the Bolivian Amazon funded by the World Bank, the creation of an investment fund to promote agro-exports, and trade promotion programs funded by USAID which focus on some NTFPs. These parallel and complementary projects are critical in creating the multi-disciplinary resources needed to harvest and market NTFPs sustainably and successfully.

2.2 Problems and Needs

Despite the numerous new efforts promoting NTFPs and related products in Bolivia there are still many problems which need to be addressed. In addition to the constraints mentioned above, these problems include:

1) Lack of coordination between researchers and enterprises

There is considerable interest on the part of the research community to investigate and develop management schemes for economically useful plant species. Too often, however, this research is not focused on those species with the highest market potential, or the results of the research are not communicated to or applied by those people extracting and marketing the products. In a similar fashion, the producers of NTFPs are not accessing the expertise that exists in local scientific institutions. An example of this disconnect concerns palmitos. There are palm specialists in the Museum of Natural History in Santa Cruz and in the Herbarium in La Paz who are very interested in assessing the regeneration of Euterpe edulis (used for palm hearts). Likewise, the palm heart concessionaires expressed interest in better management techniques and the need to present management plans to the CDF to secure the concession. Despite these mutual interests, it appears that the researchers and the producers have never spoken to discuss joint projects. There is a clear need for greater coordination between researchers and those that could benefit from their findings. Moreover, the researchers would have the opportunity to gather data from extractive plots and compare this data to areas that have not been harvested.

2) Lack of market-driven approach to research

A closely related problem to number 1 above is the frequent absence of rigorous economic analysis from studies evaluating the value of natural resources in a given area. A frequent methodology is to create inventories of all plant species in a given area and mention the current or potential uses of the species. While this type of comprehensive data may be very important for various scientific and management issues, it is probably not the most efficient method for targeting specific species for development. Straight inventories may be too lengthy or confusing to be useful for local lay people. A more analytical approach should be developed in which various screens are created to select and prioritize those products with significant economic potential. These screens would help to quickly identify top commercial candidates while more extensive species inventories are done for a complete understanding of the resource base. For example, one screen may be to focus only on those products which occur in certain densities (as a proxy for low cost production and sufficient supply). Another screen may be to only look for those species which provide inputs into consumer products (so that a "green" marketing appeal can be used, possibly to compensate for higher prices). These screens will need to be developed by the project team in coordination with the particular parameters and objectives in a given area.

3) Lack of technical assistance (particularly to community based enterprises)

Bringing any product to market is a difficult and risky venture. These difficulties are compounded when the product comes from the forest and the enterprise seeks to manage the resource sustainably and generate meaningful and just returns to local producers. Technical

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assistance at all levels (ecological, social, economic) is generally required to design and implement community based NTFP projects. In addition to short-term technical assistance, the long-term presence of a community development specialist or group is often critical during the first few years of a project.

4) Lack of financing

Despite the international interest in conserving tropical forests through their sustainable use, financing for these projects is often scarce. Development agencies have difficulty meeting these needs because projects are often below minimum size, and philanthropic funds are limited and spread thinly over a number of areas. New creative financing mechanisms need to be developed either by packaging projects together, to make them eligible for large donors, or creating new equity and credit mechanisms. The newly established Fundacíon Bolivia Exporta (FBE) seems to be an excellent effort in this direction. Additional efforts will also be needed.

5) Lack of market outreach

The marketing aspect of technical assistance deserves special mention. As noted above, the ability to market a product is often considered too late in studies evaluating commercially useful plants. Identifying a durable fiber and its use in making sacks, for example, is just the first step in determining whether there is a local or international market for that fiber and Bolivia's comparative advantage in supplying the fiber. Any successful NTFP commercialization scheme is going to necessarily focus considerable effort on marketing analysis and outreach to potential buyers. Some of these efforts are underway, such as AID's export promotion project, and marketing will also need to be a centerpiece of the BOLFOR project.

2.3 NTFP Program

2.3.1 Objectives

The NTFP program will seek to:

1) Assist in development, design and implementation of three to four integrated NTFP harvesting and marketing programs while coordinating closely with other units in the project and with local organizations.

2) Demonstrate concrete results such as an improvement in resource management practices, an increase in the level of exports, an increase in community benefits (jobs, income, management control) and a positive impact on the overall conservation of a designated area. The specific objectives of a given project will be laid out as part of the design process.

3) Provide mechanisms and methodologies for replicating project successes in other products and other locales.

2.3.2 Structure

The NTFP program will be implemented by a team of full-time professionals assisted by short-term technical assistance and a standing project selection and review committee.

The product development team will consist of an interdisciplinary group of professionals including a product development and marketing specialist, a social scientist and an ecologist. The product development team will select products to investigate and supervise the feasibility analysis from ecological, cultural, and economic perspectives. The interdisciplinary approach is intended to ensure that products are not pursued unless they are likely to be viable on all three levels. The product development team will be staffed by two Bolivians and one expatriate and will work closely with the staff from the other project components. For example, the product development team will work with the research and training staff to coordinate research regarding commercially useful species.

Once the product development team determines the initial feasibility of a product/project, it will design a work plan to bring the product to market. This will entail conducting the necessary ecological studies to ensure sustainability and creating a management plan, designing the participation of local groups if needed, and assisting with a business plan to market the product. Ultimately, the product development specialist will be responsible for finding the funding to finance the program.

Each product development program will require unique levels of effort from each team member and various amounts of coordination with outside organizations. The team will be responsible for networking with all relevant organizations to avoid duplication of efforts and to play its primary role as a coordinating "broker." The product development specialist will serve as the team leader and have ultimate responsibility for achieving the unit's objectives.

Short-term specialists. Each team member will work closely with an international technical specialist in his or her area of expertise. The specialists will help to oversee team activities and provide linkages with international partners. Specialists will facilitate project selection and design and will be associated with the project over the long-term, even though they will only be budgeted for 4-6 weeks per year.

Project selection committee. Early on in the project an outside (voluntary) standing committee will be formed to assist in the selection of product projects which require significant investment. The project selection committee will mirror the multi-disciplinary nature of the team and advisors, but will be drawn from outside of the project and should have extensive local experience. A "model" project selection committee might consist of five people including one member from Cordecruz or the CDF, one member from a local scientific institution, a local business person involved in exports, a representative from a campesino or indigenous organization, and the leader of a local environmental NGO.

The project selection committee would help the team establish a set of selection criteria which will be used to choose projects. The committee will oversee project research and design, and facilitate the implementation process by providing outside contacts.

2.3.3 Methodology

The team, advisors, and project selection committee will meet initially to design selection criteria and establish the project's procedures. The team will then generate a list of potential projects and profile them according to the selection criteria. The team will present these options to the committee and specialists so that the possibilities may be jointly prioritized. The team will then do a concise pre-feasibility study of the top options and design work plans for the most promising projects. Once the projects are approved by the committee and the specialists, the work plan will be initiated. The purpose of the work plan is to assess the potential of a product and to create a detailed plan for implementing product development.

The project work will be supervised by the specialists and the committee. The project will implement those projects judged worthy. The project's role in implementation will depend on the identified needs but may include training programs to ensure sustainable management of the resource, assisting in the formation of a local marketing group or processing plant, or finding the funding to capitalize a project.

3.0 PRODUCTS: PALM HEARTS, BRAZIL NUTS AND CUSI OIL

The first three products which should be considered are palm hearts, Brazil nuts, and cusi oil. These products are profiled in appendices at the end of this annex. These products are considered high potential opportunities because palm hearts and brazil nuts already have established export markets and cusi oil could potentially have an international market based on the consumption of the oil in Brazil and the apparent market potential of other cusi products such as activated charcoal made from the fruit's husks. These products are also found in natural forest systems and are currently or potentially very important sources of income for local people. Moreover, each of these products face specific challenges to their development. The main issues facing palm hearts is the sustainable management of the resource (the tree is felled to harvest the heart in the single stem) and increasing Bolivia's market share globally. Brazil nuts require more stringent methods for quality control, a greater understanding of the biology of Brazil nuts, increased benefits for the collectors, and a strengthening of Bolivia's position on the world market. Finally, a full feasibility analysis is needed to assess the real potential of cusi oil since it has never been commercialized at significant levels in Bolivia.

To summarize, the types of program activities that will be needed to develop these products (or any others selected by the team) include the development of sustainable management plans, a rigorous assessment of the market potential and a full business plan

detailing how the product will be brought to market and the revenues and expenses anticipated, and the creation of culturally appropriate production units and enterprises which take into account both the demands of the marketplace and the needs of local people.

4.0 ECOTOURISM

Ecotourism was examined during the design phase as an potential alternative use of natural resources in some lowland locations. At the end of the design phase (May 1993), the Swiss aid agency announced that it will sponsor a US$ 1 million ecotourism program in Bolivia. Given this development, which brings more resources to ecotourism than would have been feasible in BOLFOR, it was decided that BOLFOR will not include ecotourism as one of its activities.

5.0 MEDICINALS

5.1 Status

Using ethnobotanical research for the development of plant-based medicinals is considered by some to be the most promising use of tropical non-timber forest resources. A medicinal program may also be the most difficult and complex to design given the thorny issues of protection of traditional knowledge, remuneration to local people, and the ethics, time and expense of medical testing and regulatory approval.

Given the speculative nature of the search for medicinal products, it is difficult to ascertain the potential for Bolivia in this market. Certainly Bolivia seems as well-positioned as many of its neighbors due to the high level of biological diversity and the large tracts of intact forest which remain in the country. In addition, there a numerous local institutions with the capability of contributing to the various aspects of plant prospecting and the development of medicinals. For example, the Museum of Natural History in Santa Cruz is working with the New York Botanical Garden on a major proposal for plant prospecting. An entrepreneurial venture called Ethnobios has been formed to research and develop plant-based products.

Despite these promising trends, Bolivia will face global competition in the search for plant-based medicinals. The design team specialist found very few Bolivian endemic plants with medicinal potential discussed and that most plants with perceived medicinal potential were actually regional in nature used throughout the Andes for different purposes by different groups. While a full-scale research and screening program has not been initiated, this anecdotal comment reflects that it might be difficult for Bolivia to secure a competitive advantage in this field. It also suggests the difficulty in devising fair remuneration schemes for traditional knowledge when many groups may claim the "secrets" of a particular plant. Even medicinal plants which are endemic to Bolivia may share active ingredients found in other plants in other locales.

There are at least two sites in Bolivia selling herbal medicines: one in Santa Cruz called "El Cedrón" run by an Argentine named Sergio Tessari. According to the design team specialist the shop offered several imported herbs as well as common bee products, but no products appeared unique to Bolivia. The owner had developed his own formulas for a variety of diseases and illnesses. The list of products is available in the project files. Additionally there is a laboratory in Cochabamba which produces natural cosmetics and herbal remedies and markets them through a retail store in La Paz called Adelphi.

5.2 Problems and Needs

The development of medicinal plants faces all of the same problems and constraints discussed in section 2.2 above. The medicinals area is sufficiently complex to present several other problems which are currently being debated in international fora as well as in Bolivia. The major questions facing medicinal development are "how does one successfully prospect plants to limit the considerable costs in prospecting and testing new products?" "How does a business venture adequately protect and remunerate the traditional knowledge of the indigenous people who may contribute significantly to the discovery of an effective plant-based drug?" "How do you ensure that the plant resource is adequately managed and that it remains available for traditional uses?" "How do you establish institutional arrangements to allow Bolivian medical and biotechnological groups to use and develop their expertise?" "What are the best model contracts that have been developed to ensure compensation to the host nation where the plant grows?"

These complex questions are probably beyond the scope of this project though the BOLFOR project may be able to contribute to the resolution of some of these issues by coordinating with the public and private groups operating in this area.

5.3 Medicinals and other Products

5.3.1 Objectives

1) Strengthen medicinal plant tradition (management and use of plants) within indigenous and campesino villages for their own use to create incentives and know-how for the management of the resources and to preserve their knowledge for future generations and other applications. This aspect will be coordinated closely with the Research and Training program.

2) Establish a systematic collection and screening system to facilitate the search for new nationally needed and commercial drugs. This system must be consistent with local traditions, include a "social ecology" aspect (see below), establish enforceable contracts for the protection and remuneration of traditional knowledge, and be linked to a viable commercial drug development strategy.

3) Strengthen local groups to serve as brokers in this process.

5.3.2 Possibilities for a Coordinating Role

The role for the BOLFOR project in the medicinal area will depend on a more thorough analysis of the needs and stakeholders in this sector. The selection below provides a brief analysis of identified needs for medicinal plant development in Bolivia, the stakeholders who have been currently identified, and preliminary ideas on the role for this project.

Needs:

1) Social ecology/management of plant resources/training: Biodiversity and social ecology must be integral parts of any program of screening plants for new drug leads. Social Ecology is founded upon full participation of herbalists and peasants in their management of resources. The demand for exotic medicines and the over-harvesting by traffickers seriously threaten the sustainability of these medicinal plants. Consequently a very strong component of future research concerning indigenous use of medicinal plants needs to be the social ecology of indigenous peoples.

2) Protection and remuneration of traditional knowledge: There are currently no international systems in place which protect traditional knowledge of medicinals and provide remuneration for this knowledge. There are experiments in these arrangements such as the INBIO-Merck deal and the protocol for Shaman pharmaceutical. Enforceable contracts or agreements which are acceptable to local groups must be established before a new major drug screening/search is undertake.

3) Local collection and screening: There is anecdotal evidence that the large international pharmaceutical companies would increase their efforts in the search for drugs derived from tropical plants if there was sufficient in-country expertise and infrastructure to expedite their efforts. Local screening requires that collection efforts and ethnobotanical research be closely linked with those national institutes which have the capacity to do the initial screening for medical efficacy.

4) Linkages with international/national pharmaceutical companies or health institutes: Given the expense and time needed to identify high potential medicinal plants and the strict regulatory environment for approving new drugs for the public, local screening efforts will need to be linked to major companies or institutes with the technology, capital and expertise to develop new drugs. These linkages should be created early on so that the drug screening process is driven, at least in part, by the explicit demands of these organizations.

PARTICIPANTS

The chart below is a brief schematic of some of the local and international groups interested in developing medicinal plants listed under the categories where they are most active. While this is not a comprehensive chart it is intended to demonstrate that there are

numerous stakeholders in this area and that an intensive effort of coordination will be needed to work effectively with the major players in the critical areas.

	National	International
Social Ecology, Management Training	Local NGOs, anthropologists, ethnobotanists, herbariums	International NGOs, Anthropologists, ethnobotanists, Joe Bastien et al., WCI Herbariums
Protection/ Remuneration	IDSA	Shaman, Merck-INBIO, CI, GATT (Uruguay Round) Cultural Survival
Collection	National Herbariums Universities	Missouri Botanical Garden, NYBG
Screening	Institute of Pharmacology, Orstom/IBBA	NIH/NCI, Companies, Health Institutes
Facilitators	Yossi Ghinsberg	AID Project, CI

Key:

NGO: Nongovernmental organization
Joe Bastien: researcher on Kallawayas
WCS: Wildlife Conservation Society
IDSA: Instituto para el Desarrollo Sostenible de la Amazonia
Shaman: Shaman Pharmaceutical medicinal plant company based in California
CI: Conservation International
NYBG: New York Botanical Garden
IBBA: Instituto Boliviano de Biología de Altura
Yossi Ghinsberg: founder of Ethnobios, a start-up medicinal plant company in Bolivia

PROGRAMS

Any efforts to facilitate the development of medicinal plants will be led initially by the product development team. Due to the unique characteristics of the medicinal plant area,

a specific sub-grant may be developed to focus exclusively on medicinal plants. Again, there will need to be considerable collaboration with the Research and Training group. Appendix 5 lists potential needs and players to meet the objectives outlined above. Perhaps one of the most critical needs is to develop the capacity of the indigenous groups who are approached by researchers and entrepreneurs alike to share their knowledge of medicinal plants. These groups need training in their rights regarding their traditional knowledge and technical assistance in the type of contracts they may want to enter into with these various groups. These groups may also benefit from a series of workshops aimed at discussing the issues they face and developing their own action plan for dealing with them.

An approach to further identifying and developing non-timber products is described below:

The objectives of this program are:

(1) To identify forest products with market potential used by indigenous peoples and/or that can be developed into marketable products.

(2) To retrieve and preserve lowland indigenous populations' knowledge of the tropical forest and its products.

This program will establish a network of research collaborators among selected indigenous and peasant households in communities throughout the region, in areas of interest to the project. In each participating community, one or more households will be selected and invited to collaborate in the systematic recording and documenting of use of forest products by the household and the indigenous population (or community) they are a member of.

Participating household members of both genders will be "contracted" to collaborate in the research project on the local uses of forest products. The selection of household will be done jointly by the project and the social/cultural unit the individual or household is a member of. Criteria for the selection of the households will be developed jointly by the project unit and the group. These will include a respected position within the group and recognized expertise in the use and management of natural resources available to the group. Where such knowledge is distributed among local specialists, more than one household will be invited to participate. Alternatively individuals can be selected instead of households, taking care that gender, age, and other significant social and cultural categories are represented by the participating individuals.

The project unit responsible for this program will, in close collaboration with selected households, design a simple and easy to use research protocol (which may include cassette recordings or videotapes, if illiterate). This protocol will include broad classifications of products by their use, such food crops, wildlife, medicinal plants, construction materials, fiber, gums, spices, cosmetics, etc. The record will also include descriptions of customary rights of access to and use of forest products by individuals, the household, and/or the social unit.

The project unit will design a plan to monitor and retrieve information on regular intervals by especially trained personnel capable of identifying each product by their commonly used and scientific name.

These personnel will work intermittently in the program as part of a wider human resource and ecological research development program convened between an appropriate Bolivian research and training institution and the project. Interested students working in the program would be paid for travel and living expenses and be eligible for grants/fellowships to do field research for their dissertations.

In collaboration with the non-timber marketing specialist and short-term experts, the project unit will identify those products which appear to have commercial potential. The information on the product and its potential could then be made available to firms or institutions interested in exploring its commercial potential under a contract that includes protection for the intellectual rights of the indigenous peoples.

Examples of what the potential outputs of this program could be include the following. In his recent (1987) Ethnobotany of the Chacobo Indians. M. Boom of the New York Botanical Garden was able to identify 360 species of vascular plants in at least 221 genera and 79 families. Of this total, 305 species in at least 197 genera and 75 families are used as food, fuel, construction and craft, medicines, poisons and a source of cash. Research was conducted in the village of Alto Ivon, near Riveralta. In a separate article, Palicourea brachyloba, a small tree about 5 m tall and 10 cm is discussed. The Chacobo Indians chew the leaves as a remedy for toothache. Apparently, there is interest in this tree by pharmaceutical companies. In a pending grant proposal, the New York Botanical Garden, the Noel Kempff Mercado Museum of Natural History, and three pharmaceutical companies propose to investigate over five years new drugs based on medicinal plants used by indigenous peoples in the Izozog area. They list possible drugs for the treatment of "... cancer, malaria or another of the more recalcitrant diseases of mankind". Also noted, in this regard, is the work of P. Arenas (1981) from the neighboring Paraguayan Chaco who documented the use of 268 plant species by the Lengua-Maskoy Indians for medicinal and other purposes.

Depending on the results of wildlife status surveys, and the ability of the Bolivian government to enforce regulations concerning commercial trade in wildlife products, a wide variety of wildlife products (with a proven economic potential as vouchered by the previous enormous illegal trade) could be pinpointed for potential marketing. These include both products derived from skins (e.g., caimans and capybaras) as well as live animals for the pet (parrots and macaws) and biomedical markets (primates).

APPENDIX 1
OTHER POTENTIAL PRODUCTS

tree "cotton"
Jipijapa
wild pineapple
Tagua (vegetable ivory)
Sunca (for ropes, etc.)
Sangre de Toro
Sangre de Grado
Copaiba
Majo (Jessenia Batua)
Motacú (Scheelea Princeps)
Palma Real (Mauritia Flexuosa)
Totai (acrocomia totai)
Aceite de alemandra
Oje
Sucuba
other medicinals

Note: These potential products are derived from research previously done by CI on Amazonian resources. Further research on these and other potential products is anticipated during the life of BOLFOR.

APPENDIX 2
PALM HEARTS (PALMITOS)

Product: Bolivia exploits the palm species *Euterpe edulis*, known locally as Asahi, for its palm hearts. This palm is found in extensive stands in the Santa Cruz and Beni Departments. According to the local industry leaders, the Euterpe is a superior product to the palm hearts extracted or cultivated in other countries. In particular, its texture is reportedly much softer and less stringy.

In addition to the palm hearts, the felled Euterpe trees may be used for the production of beetle larvae known as "suri" in some parts. "Suriculture," a term coined by Dr. James Duke in 1992, refers to the cultivation of the larvae as a high protein food source using the decaying palm trees as the home. Coincidentally the topic of beetle larvae and palm weevils was mentioned in the latest issue of Principes (the palm journal) in which it outlined the use of the larvae for local food and as an international delicacy. The larvae have two benefits 1) food, 2) potential commercial value, 3) uses the waste product from palm heart production.

Ecology: The Euterpe is a single stalk palm which means that the tree must be felled to extract the single heart. Other species of palm, the Bactris, for example, has multiple stalks and thus the tree can regenerate after a single stalk is cut. Reportedly the tree can be cut between 8-13 years, when it reaches an average height of 12 meters. For Euterpe production to be sustainable a vigorous planting program must be established.

Both of the companies interviewed explain that they operate according to a management plan, designed by their own forest engineers, which includes the plantings of new Euterpe trees. However, personnel at the Museum of Natural History in Santa Cruz report that Euterpe is disappearing in certain areas in of northern Santa Cruz, though it is unknown if these observations include land in the concessions where the companies are operating. Moreover, the Museum staff was unaware of any published studies regarding the regeneration of Euterpe.

Production: There are three major companies harvesting Asahi in Bolivia. Two of the companies, Ichilo and Itenez, are managed by brothers and their family has been in the business since 1968. A third company, La Granja, entered the business two years ago. The Ichilo and Itenez companies jointly operate a 250,000 ha parcel in Santa Cruz and a 200,000 ha parcel in the Beni. La Granja manages an 86,000 ha parcel in the Beni. The "concessions" are called "areas de corte" and are limited solely to Asahi extraction. In Santa Cruz, the "area de corte" is issued by the CDF. La Granja is interested in obtaining an additional 100,000 ha in productive area, and the other companies may be interested in expanding as well. The Pausa Ecológica may prevent this expansion at this time.

The technology for palm heart extraction appears to be quite basic. Laborers (often temporary migrants from surrounding areas) fell the approximately 12 meter trees and carve out the 1 meter section which contains the heart. This 2.5 kg section of the tree is transported on the backs of the laborers to the factories where they are peeled, cut, preserved and canned. The palm hearts must be processed within two days after they are cut or they

will spoil. Each palm heart yields approximately 400-500 grams of edible product, which is packaged in water and citric acid for a net weight of 850 grams per can. In other words each tree yields about 1 can of product.

The season for harvesting Asahi is May to December. La Granja says that it employs over one hundred people from the Camiri area and Ichilo says that it employs 850 people including the workers in their four factories.

Assuming that Bolivia's total production of palm hearts comes from these three concessions and the total production value is assumed to be approximately $711,000 then the gross value per ha = $1.33 (total sales/ha).

Markets: The total export market for Asahi palmitos in 1992 was 248,340 kg totalling $639,918. Assuming that local consumption represents 10 percent of total production and is sold at the FOB price, the total market equals, $711,000. The principal importers are Argentina and Chile (consuming 91 percent of exports in 1992) followed by Japan and Uruguay. In 1991 Peru also imported a small percentage of production.

The total world market was unknown but estimates ranged from $20-25 million. France alone is reported to consume 2000 tons per year or 8 times the current level of Bolivian exports. The article labeled Brasil, September 1986 indicated that the Brazil may have exported as much as $23 million in 1986 which would suggest that the world market is actually considerably larger than the Bolivians estimate. This same article mentions that the U.S. and France are the principal importers of Palmitos from Brazil (the principal supplier).

The average price per kilogram from Bolivia in 1991 was $2.39 and this increased to $2.58/ kg in 1992. (MECE stats) While prices to South American countries were similar, prices to Japan during these two years were 30-40 percent higher than to other countries.

The market shares of the three companies are unknown, but it is presumed that Ichilo and Itenez make up the majority of the production given the size of their concessions and their tenure in the industry. However, this assumption may be invalid if the production of the two larger companies has not been sustainable and they have exhausted the Asahi resources on their lands. Ichilo reports a productive capacity of 15,000 cajas a year while La Granja reportedly sold 6000 cajas in 1992. These number are nearly double the actual exports. If La Granja actually sold 6000 cajas (122,400 Kg) this would equal 49 percent of the export market. If this is true it may indicate that the current production rates on the older concessions are not sustainable. However, Ichilo claims to have an annual production greater than the country's entire production, thus it is difficult to draw conclusions.

The major competition in palm hearts comes from Brazil, Costa Rica, Colombia, and Ecuador. The Bolivians claim a far superior product to their competitors, who are harvesting different species. Brazil is said to control the market, selling the Euterpe Olearacea species at $44/24 latas. Despite the difference in quality, the Bolivians suspect that currently the U.S. and European markets do not appreciate the difference in quality and simply purchase the "inferior" but cheaper product from other countries.

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Both companies are very interested in entering the U.S. and European markets. Apparently, the regulatory environment in the U.S. has been streamlined, possibly making it easier to export palmitos there. Ichilo was also quite interested in the possibilities of the organic market.

Industry Problems and Opportunities: The Ichilo manager estimated that Bolivia captures only 3-5 percent of the world palm heart market and they suspect that the world market is growing. Bolivia may be able to expand their markets if the market is growing, if they can grow their market share by finding buyers that care about a "superior" product and/or by looking for under-exploited market niches such as the organic food market or the "green" sell.

The major industry problems cited by the companies were 1) insufficient transport systems and infrastructure, 2) expensive packaging imported from Brazil (why can't Bolivia make its own tin cans?), and 3) price competition from competitors selling an inferior product. While the companies did not mention it, over-exploitation of the resource is another serious industry problem that must be considered.

Possible Project Interventions:

1) Sustainable Management

Get the palm folks out there to do studies, use the concessions as study plots, and investigate the use of different species with multiple stalks and easier regeneration (e.g., does the market value the difference of the Euterpe Edulis? What are the market opportunities for using a different species at a lower cost?)

2) Marketing

Assuming it passes the sustainable management/conservation screen:

- o support product marketing campaign "our's is better"
- o seek green niche
- o seek organic niche

3) Community participation

Explore possibility of surrounding communities linking with factory. Are workers paid enough so that palmito extraction substitutes for more destructive land use practices? Possibilities of opening new factories in area of palmito concentration (e.g., is there anything in El Puente?)

Summary: Currently Palmito production is only a $600,000 to $700,000 per year industry. However this could be an important product because it employs around 1,000 people and three large concessions total 536,000 ha in possibly important forest areas. Moreover, Bolivia has only captured a fraction of the estimated world market in palmitos and thus there may be significant growth potential. A more in depth analysis needs to be done to 1)

ascertain exactly where the concessions are and where future concessions may be let, 2) the management practices currently being used and the opportunities to exploit palmitos in an acceptable way, including an investigation of the use of other species and their management, 3) the labor practices employed and laborers impacts on the land, 4) the opportunities for market growth in comparison with productive capacity, 5) the possibilities of tying small landholders into the system, and 6) the overall conservation benefits of the project.

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APPENDIX 3
CUSI OIL

Product: The Cusi palm *Orbignya phalerata* is distributed in important populations in the Departments of Santa Cruz, the Beni, and Pando. The palm and its fruit can be used for a variety of purposes, the most commercially important being the oil extracted from the kernels, the activated charcoal which can be produced from the fruit husks, and animal feed produced from the kernel residues.

Within Bolivia the Cusi palm is used primarily for household consumption needs. The oil is extracted by very rustic methods and used as an edible oil and as a hair oil. There is a very small national industry in Cusi in which laboratories in Cochabamba market Cusi oil supplied by the Guayaros and Chiquitos provinces of Santa Cruz. Small bottles of Cusi can be purchased by street vendors or in a limited number of "natural cosmetic" retail outlets.

Ecology: The Cusi palm grows in lowland areas, swamps and in wooded savannahs and can often be found in pure stands called "cusisales." Because Cusi needs a lot of light, it can be found to dominate altered and open zones. In Santa Cruz, extensive natural cusi stands can be found. No plantations currently exist.

It should be quite feasible to manage a sustainable production of products made from the cusi fruits, since fruit harvesting does not need to damage the tree. The primary management issues include ensuring that the tree is not felled to harvest the fruits and monitoring the impact of fruit collection on the regeneration of the trees and the impact on plant and wildlife which may depend on the fruit for nutrients.

As with all forest product harvesting schemes, considerable attention must be given to the relation between the producers and the ecology of the production unit. Harvesters may manage the cusi resource well but damage the ecosystem if they hunt and cut timber to sustain themselves during the harvest season.

Production: The current extraction and production methods of Cusi are very rudimentary. Local people collect the fruits which have fallen to the ground and dried for several weeks. Using machetes to cut through the hard fruit they extract the kernels and roast them. The kernels are crushed in a mortar and the paste is boiled in water which causes the oil to separate and rise to the top of the pot where it is manually skimmed off. Finally the oil is boiled to remove excess water, filtered and bottled.

Preliminary investigation suggests that 20 kilograms of raw material is needed to produce a kilogram of oil and that the annual production of each plant is approximately 15 kilograms of oil. According to local informants cusi harvest is possible throughout the year though this has not been verified.

Markets: In general palm oils are relatively good substitutes for one another and this is the major constraint limiting the potential of developing a single palm oil product. On the world market, African oil palm and coconut palm oil produced on vast plantations dominate the

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market and provide stiff competition at a commodity price of (as of March 1993). At the local level, local people interchange various palm oils for their household use as a hair oil.

The current markets for Cusi products from Bolivia are extremely limited. Interviews with the laboratories that commercialize cusi oil report a national demand of only 100 liters annually, though this does not include informal trade or personal use of the product which probably makes up the bulk of production and consumption. The only export statistics available show an export of 8,425 kilos of kernels to Argentina in 1987 and a shipment of 14,969 kilos of kernels to the U.S. in 1989. These exports were made by the companies "Agro Guayaro" and Durania SRL respectively.

The price of cusi produced at the artisanal level varies relative to the cost of other agricultural products. However, 10-15 Bolivianos is anecdotally the minimum price for a 750 cc bottle. (as of July 1992, CI report).

On the international market, Brazil is the leader in the product and export of cusi oil, known as Babassu locally. Total production between 1965-86 varied between 50,000 and 120,000 metric tons. During the last five years of this period exports accounted between 0 and 13.4 percent of total production.

In the past few years new initiatives have been started to build an international market for Brazilian Babassu oil. Cultural Survival Enterprises, Cambridge MA., has been selling the oil to small "natural" cosmetic companies in the U.S. and to the Body Shop in England. The oil is used for hair and body lotions. One of these small buyers reported that they had problems with purchases of Babassu from Brazil because it was contaminated with DDT. Apparently Cultural Survival subsequently found "clean" sources. There are no publicly available sales figures at this time.

Industry Problems and Opportunities: Cusi is a very interesting non-timber forest product, because like other palm products, extensive stands occur naturally in the project site. Many experts have pointed out that forests dominated by a few species may have the most economic potential for exploitation, replicating (in some ways) the economics of their competitive plantation species.

The fundamental issue facing a potential Cusi project is whether there is significant long-term demand for palm oils which can compete with African oil palm and coconut oil. The highly substitutable nature of palm oils and the extremely low price of the high volume oils make a cusi project (and other palm oil products) risky. There does seem to be interest in the green market for Babassu oil and it is possible that this market could be developed. If the price of Cusi could be brought down, even a fraction of the international oil market could be a significant business.

The price of Cusi oil will be highly dependent on the production technology used. At the artesanal level that is now practiced, Cusi is two to three times the cost of the low cost palm oils. Even a green marketing campaign would probably not be able to overcome this price differential (depending on the cost of the oil as a percentage of the overall cost of the

product). The proposal for investing in the Cusi factory in El Puente indicated that modern processing technology could dramatically reduce the price of Cusi oil and make it competitive with the other oil palms. This could be particularly important if the oil was targeted for Brazil or other South American markets. The proposal also suggests that Cusi oil is a viable business particularly if it is part of an integrated plant which also produces other products from the Cusi fruit such as activated charcoal and animal feed.

Possible Project Interventions: There has been considerable interest in exploiting Cusi palms in Bolivia over the past decade. Considerable research has been done on the extent of the palm stands, the financial feasibility of an integrated processing facility, and the technology required to make Cusi products competitive. Regardless of these efforts, a Cusi project remains elusive and there are additional issues to consider from the perspective of the BOLFOR project.

A final assessment of a Cusi project should include an ecological assessment of extraction methods and impact on the ecosystem. Perhaps more importantly, given the superficially sustainable nature of Cusi harvesting, is the need for a socio-economic study which would explore the social impacts of the factory including the labor needed and the requirements of sustaining that labor force. Clearly the conservation linkage of the project would need to be examined. What areas would be conserved and what is their ecological importance? Would there be opportunities to include other small landholders into the project if it were successful? Would concessions need to be granted for harvesting Cusi and what are the implications of these concessions? etc.

The Fundacion Bolivia Exporta (FBE) indicated interest in exploring the viability of the Cusi plant. The BOLFOR project could team with FBE to jointly assess the status of this project and if it appeared promising, establish a joint work plan where the BOLFOR project may take on research of the ecological and socio-economic aspects of the project and assist with the market research and export promotion. FBE for its part could finance the start-up of the factory and possibly finance the participation of other community enterprises which would feed into the factory. Alternatively, the team may determine that a new factory or production system may be more desirable.

Summary: Cusi products may have significant potential but a closer look at the markets and the underlying economics of the industry needs to be taken before additional research is undertaken. A final assessment of the opportunity needs to be made to bring resolution to the numerous attempts to get a project started.

APPENDIX 4
NEEDS AND PLAYERS OF NTFPs IN BOLIVIA

NEEDS	LOCAL	INTERNATIONAL
Identification of potential products (ecology, economic, cultural)	Herbariums, Universities, Carana, DHV project, NGOs	MBG, NYBG, CI, CS, NGOs
Resource Management, sustainable supply		
Marketing Study	Carana, local firms, consultants	CI
Management Plan		
Local production		
Harvest	same as 1	same as 1
Processing	appropriate technology PROATEC organic	appropriate technology ATI et al. organic
Export	CARANA FBE	ATOs
Market Links	same as export	same as export
Capital Credit Needs	FBE, banks, firms, FUNDES, PRODEM	aid agencies banks, firms
Monitoring and Evaluation	same as 1	same as 1

APPENDIX 5
SELECTION CRITERIA/CONSIDERATIONS FOR PRODUCT DEVELOPMENT

Introduction

The product development team will need to assess potential projects against a number of economic, social and ecological considerations. The team, with the input from outside advisors, will need to establish the criteria for selecting projects. The team may decide to set certain hurdle rates (e.g., only consider products with total market potential over $10 million), goals to develop certain capacities (e.g., only consider palm products, or products aimed at consumer products markets), or goals of demonstration (e.g., one product which involves harvesting the fruit and another which requires felling the tree and re-planting to show different management schemes or one project which focuses on an existing private enterprise and one project which assists a community-based effort).

The list below highlights the major factors which need to be considered in designing the project selection criteria.

Economics

profitability of venture, time frame
start-up costs, working capital needs
complexity of the venture
Bolivia's comparative advantage, competitive climate
total market size and growth potential
market demand fluctuations (quantity and price)
- seasonality
- sensitivity to trends
- price elasticity

type of market (consumer, industrial etc.)
type of enterprise, length of tenure

Social/Cultural Aspects

number of jobs created
labor needs, creation of migrant positions
displacement of traditional activities
percentage of income derived from proposed activity
level of interest of local community
capacity of communities to participate in venture
cultural appropriateness of proposed venture (social norms)
land tenure, resource rights

Ecological

length of time to assess sustainability
possibility of sustainable extraction of species and minimal impact on ecosystem
difficulty of monitoring and evaluating ecological impact
ecological risks and sensitivities
harvesting techniques (harvest fruits or fell trees)
potential benefits for conservation (e.g., buffer zone of park)

ENTERPRISE DEVELOPMENT

Types and Nature of Enterprises

The term enterprise is meant to include for-profit firms of all sizes as well as community-based and indigenous group associations and cooperative enterprises. These firms are involved in timber and non-timber products and services. Further, this is not a single industry; there are a diverse range of product categories (sawn lumber, nuts, oils, food additives, latex, etc.) and end markets (from industrial processors to final consumers abroad). The enterprises include:

- Small, medium and large concessionaires and saw mill operators.
- Truckers and transport companies.
- Exporters from Santa Cruz well as in border towns.
- Medium to large companies manufacturing furniture and components, carved doors, parquet floors, veneers, etc. for sale both domestically and abroad.
- Family owned microenterprises and small businesses producing furniture and other wood products for the local market.
- Community associations of campesinos or indigenous groups producing and selling products, mostly for domestic consumption.
- Producer and marketing associations and cooperatives.

Except for the few large, vertically integrated concessionaires, most of the enterprises engaged in the timber, non-timber and ecotourism areas are small and medium sized. Figures obtained from CDF and the Camera Nacional Forestal (from 1990), indicated the following:

Industry Type	Location		
	Santa Cruz	Other	Total
Sawmills	85	132	217
Veneer mills	5		5
Parquet manufacturers	1	1	2

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Particle board	2	25	2
Railroad ties	12	1	37
Doors/windows	1	1	2
Match plant		1	1
Preservation plant	1	1	2
Drying plant	4		5
TOTAL	111	162	273

More recent information from the Santa Cruz Department only (Forest Sector Study by Stolz and Quevedo, January 1993) suggests that of the 142 "empresas forestales" registered in CDF, 127 are "empresas maderas". The remaining 15 include palmito canning factories, other wood products and vegetable carbon production operations. Of the 127 wood based firms, 30 have gone out of business, leaving 97 firms in the wood industry. These 97 firms have an average fixed capital of $369,000 and are involved in 134 different product lines. Only 13 of these firms are operating above 60 percent of installed capacity; the average for all 97 is only 28 percent.

If about 24 percent of the firms (30/127) went out of business in Santa Cruz, and that same 24 percent would be realistic for the country as a whole, then of the 273 firms in Bolivia, one could say that only about 207 are still operating in 1993.

Data does not exist on the number of enterprises operating in the non-timber products/services category. While guesses can be hazardous, the total number of these firms probably does not exceed 50 for all of Bolivia, with at least half of them operating in the Santa Cruz department.

Principal problems and constraints

The constraints to be addressed are not unique to this sector and include: lack of knowledge (at the enterprise level) of market opportunities and requirements; inadequate information systems (for data on: market prices, product quality and sanitary standards, rules and regulations governing imports to foreign markets, potential buyers/importers/distributors, technical materials); lack of modern processing and quality control techniques and technologies; lack of knowledge of alternative uses of raw materials or by-products of the production process; non-sustainable cultivation and harvesting practices; high transportation costs; lack of proper packing and storage techniques; and access to financing for new and expansions of existing enterprises.

Many of these problems can be addressed by a technical assistance and training program during the course of project implementation. This does not necessarily mean these constraints will be alleviated for the sectors or for enterprises and their associations after the project ends, although they could be in some cases (e.g., building local capabilities to solve

their own problems in the future). However, during the course of implementation at least, the constraints can be overcome.

On the matter of credit, which is normally a problem for new or existing enterprises particularly operating in nontraditional sectors, there are no easy solutions. The basic approach is to look for existing sources. In Bolivia, working and investment capital will not be easy to find for new enterprises in particular, or for expansions of existing businesses in NTFPs. Some micro and small businesses programs exist (e.g., Banco Sol, FUNDES, PRODEM), but mostly for urban areas.

Also, the Fundación Bolivia Exporta has just begun operations and is interested in collaboration with BOLFOR because their mission requires attention to nontraditional products. The Fundación has both a finance and marketing capacity; finance will normally be provided in the form of equity investments. The Fundación is currently collaborating with CARANA on a project to improve the quality of Brazil nut exports. Their work plan for 1993 indicates that they plan to be involved in about 10 projects, of which several are of potential interest to BOLFOR - rubber production and latex products; activated carbon from Cusi palm; Brazil nut oil; tropical fish; and mini rubber plants.

Needs and Types of Assistance

Several approaches will be used to meet enterprise needs:

- Working with and through industry associations such as the Camara Forestal to build their technical capacity to assist their members.

- Working with and through NGOs, community groups and associations of indigenous peoples, to build capacity to oversee and provide specific advice on cultivation practices, production quality, transport options, marketing programs, etc.

- Focusing on enterprises themselves as operational businesses (i.e. to make money or at least break even to survive), rather than just addressing the production or the marketing activities of the enterprises. This approach is necessary to address problems such as: sustainable sources of raw material supply, improved product quality (including factors like design and packaging materials), and product costs (which include production, storage, transport and other costs).

To achieve the component's objectives, focusing on products or services alone is not likely to be sufficient. The enterprises in this sector are fragile, often lacking managerial, financial, technical and marketing expertise and knowledge about these topics. Thus, reaching the commercialization objectives of increased value and volume of products produced and sold, especially to export markets, will require a more comprehensive set of services than just the production and marketing aspects. As a rule, the project will direct its resources to existing enterprises, with a track record of several years (1-3) of operational experience. The failure rate of new enterprises is high; however, there may be occasions

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when the project will help to establish a business. For example, there could be a case where a sustainable cultivation and harvesting practice has been demonstrated for a NTFP, which had never been marketed from a particular site by a community group, but where that group has had experience in operating an enterprise for another product.

Recommendations on a program of assistance

Several objectives will drive the services provided to enterprises:

- Increased valued added of wood products produced; development, production and sale of NTFPs in a sustainable manner; and increased number and value of non-wood products.

- Establishment of systems of market and product information that can continue beyond the life of this project.

- Enhancing the capacity (financially, managerially, technically, etc.) of enterprises to operate profitably.

Activities that are undertaken in this subcomponent will be based first on further identification of problems and constraints and needs of the timber and non-timber subcomponents, and second in the specific enterprises themselves. The intention here should not be to assist and build enterprises for their own sake; rather, this subcomponent will support the timber and non-timber product development programs. Thus, before a final strategy and program for enterprise assistance can be formulated, specific products or services have to be identified and sites agreed upon.

In any case, the following suggestions are likely to hold and form the basis for an enterprise assistance program:

- Financial and credit analysis, planning and budgeting to assess the financial viability of an investment, the cash flow needs to support production and marketing, and the borrowing capacity and needs, all to assist in presenting loan requests and to recommend and install financial controls.

- Organizational strengthening or restructuring the managerial aspects of operating an enterprise effectively and efficiently, particularly in cases of fast growth or shifts of sales from domestic to export markets.

- Advice on production, processing, and manufacturing quality control and marketing.

- Advice to assess legal aspects, implications and protection of e.g., an investment in a new NTFP.

- Legal and technical advice on establishment and initial operations of a potential foundation, to support NTFP development.

This program would be carried out by long- and short-term technical advisors from the U.S., Bolivia, and third countries. Technical advice and training would be provided in the form of one-on-one assistance, as well as group training and workshops, informational seminars, and marketing or observational tours abroad.

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ANNEX D2
ENVIRONMENTAL ASSESSMENT

Project Goal

The goal of the proposed project is to reduce degradation of forest, soil and water resources and help conserve Bolivia's biological diversity.

Project Purpose

The purpose is to build Bolivian public and private sector capacity to develop and implement programs for sustainable forest use. This will be accomplished through a tightly integrated set of activities including applied research, training, natural forest management demonstrations, value-added enterprises and marketing, and policy analysis and dialogue.

If the purpose stated above is achieved, the majority of the forests of Bolivia will be under legally defined and internationally certified site-specific management plans, either for the forest unit as a whole or for specific products. Progress will be measured by the establishment of commercial scale models of sustainable use based on research results.

Project Activities

The primary and supporting project activities listed below are described in detail in the Project Paper. The primary project activities include:

- Natural forest management
- Value-added enterprise development
- Marketing of timber and non-timber forest products
- Monitoring and evaluation

Supporting project activities include:

- Applied research
- Training and information dissemination
- Policy analysis and dialogue

Conclusions

1. The timing of the Sustainable Forest Management project is ideal. Bolivia has enacted legislation, the *Pausa Ecológica*, requiring by 1995 that forest products exported be certified by the GOB as coming from sustainably managed forests (Decreto Supremo 22884). This project can play a key role in providing the technical basis for helping Bolivia achieve its 1995 goal.

2. International certification that timber and non-timber products come from sustainably managed forests will soon become a significant factor in world markets. The European Community led by Germany, has given Bolivia notice that it intends to close its markets to uncertified timber products. AID regulations concerning tropical forests strongly complement certification guidelines. The project will vigorously promote certification both technically and in policy dialogue.

3. A conditionality on the sustainability of forest management from an ecological and social perspective will be adherence to a combination of national and international certification requirements. Why this caveat? According to the 1992 World Bank Forest Sector Review, trees and wood prices tend to increase slowly, while real interest rates in Bolivia have been around 15-20 percent. As long as investing elsewhere is more attractive than allowing trees to grow, rapid depletion of marketable timber will continue unless constraints are enforced.

4. Several issues beyond the direct purview of this project will, nevertheless, have a significant influence over its orientation and degree of success. Issues in various stages of political discussion include:

- Secure access to land and forest resources (a major World Bank project will address this issue).
- Greater transparency in the granting and transfer of forest concessions.
- Resolution of indigenous land claims in the Bolivian Oriente.
- Government's will to pass an effective forest law and enforce related regulations.

Background

The Sustainable Forestry Management Project is the first project in the Latin America and Caribbean region to employ the Design and Performance (DAP) mechanism for contracting. In many ways the project will break new ground, both in the collaboration of contractor team with USAID and Bolivian institutions during design, and in the dual emphasis on forest production and protection. FONAMA (the Fondo Nacional del Medio Ambiente) and SENMA (Secretaría Nacional del Medio Ambiente) have played a major role in project design with important contributions from the Centro de Datos para la Conservación (CDC), Bosque, Conservación y Manejo (BCM) and the Ministerio de Asuntos Campesinos y Agricultura (MACA). Closely involved are the Agricultural and Rural Development Office and PL-480 program of USAID/Bolivia.

Half of Bolivia is covered by lowland tropical forest, but less than 10 percent is in parks. The vast areas of forest outside the parks are subject to degradation by inappropriate logging practices or conversion to cropland and pasture. Some 22 million hectares are currently under forest concession for the extraction of timber with overlapping concessions in

some areas for products such as palmito, Brazil nut and rubber. It is the challenging premise of this project that sustainable management of forest lands will result in:

1. The maintenance of a flow of timber and non-timber forest products competitive with returns from conversion of the land to other uses; and

2. The maintenance of a large measure of biological diversity, ecosystem structure and other values of importance to society.

The sustainability of forest management from an ecological and social perspective will be defined and enforced through adherence to a combination of national laws and international certification requirements.

Major Project Elements

To achieve the dual goals of production and protection requires tight integration of components. The capital intensive business of processing forest products cannot be sustained without the forest, nor can the products be sold abroad unless equal attention is paid to maintaining biological diversity and growing trees. Since putting this novel concept into practice is new, it must be supported by applied research, training and broad dissemination of results in a favorable policy environment. This complex process must be closely monitored and timely adjustments made if the goals are to be achieved.

The project encompasses the tropical forests of eastern Bolivia. However, initially the geographic focus will be on two sites:

- **Moira.** The 150,000 hectare Moira concession in the Bajo Paragua region of the Department of Santa Cruz. The site is flanked by the Noel Kempff Mercado National Park and the Rios Blanco y Negro Wildlife Reserve, where highly applicable ecological research has taken place.

- **Lomerio.** The Central Intercomunal Campesina del Oriente de Lomerio (CICOL) comprises some 23 Chiquitano communities southeast of Concepción in Santa Cruz Department. The well organized forestry project in this area can effectively use complementary support from the Sustainable Forestry Management Project.

Choice of a specific geographic area does not preclude the choice of other sites at a later date. This site specific focus will allow the EA to explore in greater detail the potential impacts of project activities. Lessons learned during this process will help the implementation team to more precisely define subsequent assessment requirements as project activities are replicated in other areas of the Bolivian Oriente.

Implementation Schedule

Phase I (First 12 to 24 Months). The project implementation will begin in July of 1993. It can be assumed that the first two months will be largely spent setting up offices, establishing working relations with counterparts, and assembling supplies and equipment. Once the logistics of settling in and team formation is complete, the critical process of institutional coordination will begin. This EA covers all anticipated activities during the first 18 months.

Phase II (24 - 48 months). The most dramatic addition to project activities during Phase II will be the launching of demonstration and training activities.

Phase III (36 months to End of Project). By the beginning of Phase III the project should have a good idea of what sustainable forest management looks like under specific site conditions in Bolivia. By this time the Pausa Ecológica and European Community deadlines for certification of sustainability of management will have passed. A broad spectrum of the forest products industry should be ready to iccept and apply sustainable management techniques.

Summary of anticipated Year 1 activities

The project implementation will begin in september of 1993, at the peak of the dry season timber harvesting period. Once the logistics of settling in and team formation is complete, the critical process of institutional coordination will begin. Data gathering in support of hypothesis testing for priority topics will begin during the first four to six months and continue into the second year. Examples include:

- Measurement of the impact on biodiversity and ecosystem structure of existing palmito and timber harvesting in the Bajo Paragua and Lomerio. This research will allow identification of training needs to improve the environmental performance of loggers.

- Baseline data gathering on fauna and key ecosystem parameters can begin early in collaboration with the herbaria, the Wildlife Conservation Society (WCS) project and other institutions.

- Sites for field testing of forest management strategies for timber and non-timber products can be identified.

- In collaboration with the marketing group, new tree species with a potential in the market can be identified for research into their regeneration and the impact of their removal on the rest of the ecosystem.

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Given that baseline data gathering, preliminary research and non site-specific training will occupy much of the first year, little supplementary EA activity is expected during the first six to nine months. The activities for which this EA was prepared are expected to begin early in the next dry season. An update may be required if deviation in site or approach varies significantly.

Activities Triggering the Environmental Assessment

The principal functions of the Environmental Assessment during the project design is to serve as both a check and a design guide. The EA will assure that production which enhances the economic value of the forest, is balanced by protection that maintains the ecological values represented by the forest. The EA has been carried out in accordance with procedures called for under federal regulations (CFR 22, Part 216). In addition, Section 533(c)(3) of the 1991 Foreign Operations Appropriations Act prohibits the use of economic assistance funds for:

> "any program, project or activity which would result in any significant loss of tropical forest; or involve commercial timber extraction in primary tropical forest areas, unless an environmental assessment: (i) identifies impacts on biological diversity; (ii) demonstrates that all timber extraction will be conducted according to an environmentally sound management system which maintains the ecological functions of the natural forest and minimizes impacts on biological diversity; and (iii) demonstrates that the activity will contribute to reducing deforestation."

Tropical Forest Issues Addressed in the EA

The EA for the Sustainable Forestry Management Project is structured to address the Congressionally mandated concerns outlined in Section 1.2 above and to recommend measures which may need to be included in order to minimize potential adverse environmental impacts of project activities. The EA combines a site-specific focus on two forest management units with an overview that provides the reviewer a perspective on what activities are anticipated and how the project is likely to proceed over the next seven years.

The EA specifically addresses small plot research in tropical forests. It is important to note that none of the major forest management demonstrations and forest management plans described in this EA nor any activities requiring supplementary EAs will take place during the first year of the project. Once the project is established in the field, the team will organize and direct small plot and species specific research, inventories, and feasibility studies. Once discrete packages of information have been developed which show promise as contributions to sustainable forest use, they will be subjected to a supplementary assessment before demonstration, training and dissemination activities begin.

Impacts on tropical forests of small plot research on such topics as tree felling, log extraction, and silvicultural treatments addressed in the EA include:

- Impacts on the ecological sustainability of forest resource use
- Impacts on plant and animal populations

The EA Team

Composition of the EA team and the timing of its activities reflects the collaborative DAP process. During the preparation of a conventional Project Paper the EA team often begins its work once the project design is nearing completion. In the case of Sustainable Forestry Management Project the EA has been conducted parallel with the Project Paper preparation. EA team members have had direct input to the design of the project, particularly in the protection component with its strong emphasis on research and training. EA team members were in the field together with the forester, marketing expert, economist and anthropologist participating in interviews, field observations and lengthy discussions on project design.

The EA Team Leader, Dr. Joshua Dickinson, had sole responsibility for guiding the EA preparation, while the forest ecologist from the contractor team was responsible for both design of the research and training component and contributing to the EA. Dr. Francis Putz, the forest ecologist, has a strong familiarity with forestry practices and sustainability certification procedures and therefore was able to provide a strong logical link between the production forester's perspective and the design of research to support realistic impact mitigation measures.

Balancing the contractor contribution were three scientists representing an array of environmental concerns and competencies. They had no vested interest in the outcome of the design other than to assure its environmental soundness. According to the team's Terms of Reference (attached) all EA team members must approve the final product prior to submission. The independent team members include Dr. Peter Frumhoff, an animal ecologist and biodiversity specialist serving as a AAAS Fellow with AID/EID in Washington who had participated in the BOSCOSA EA, Dr. Howard Clark, a plant ecologist serving as the Regional Environmental Advisor for South America and Dr. Jeannine Koshear, a geographer and AAAS Fellow with ethnobotanical experience from AID/R&D/ENR.

Mitigative Measures

The following mitigation measures will enable USAID/Bolivia and the BOLFOR Project participants to offset, minimize, or avoid any possible adverse environmental effects and to ensure that project activities are carried out in an environmentally sound manner. The measures presented are primarily directed to ensure that forestry and associated project activities are carried out in a manner that, in accord with Section 533(c)(3) of the 1991 Foreign Operations Appropriations Act, maintain the forest's ecological functions and minimize impacts to biological diversity. Note that many of these mitigative measures are based upon the current plans of the BOLFOR project design team and are fully consistent with the project's goals and objectives.

Mitigative Measures for Currently Specified Project Activities

1. Prior to the establishment of the BOLFOR Project research plots on the Moira concession, a binding agreement should be reached between the Project, the concessionaire and appropriate public and private authorities (e.g. the Cámara Forestal and CDF) that (a) the research plots will be under the full control of the Project during the life of the project, and (b) the BOLFOR silvicultural research practices will not be promoted by the project until research determines the conditions under which the ecological sustainability of these practices can be assured. This research should include, but not be limited to, an assessment of the (a) the abundance and distribution of commercial trees of intermediate size classes that would be freed from competition, (b) the abundance and distribution of wildlife populations that might be affected by this practice, (c) the identification of keystone species (e.g. non-commercial trees providing important fruit crops during periods of seasonally low fruit abundance) or habitats (e.g. streamside corridors) that should be fully protected, and (d) studies of the effects of liberation thinning and other forestry practices on biological diversity.

2. The BOLFOR project should investigate the role of natural and anthropogenic fire in the Lomerio and Bajo Paragua forests, and, as appropriate, institute fire control programs at both sites.

3. Project activities at Lomerio should support the training of community members in sustainable forest and wildlife management.

4. The BOLFOR project should support research into the subsistence use of wildlife in the Moira concession and Lomerio community to assess (1) the impact of hunting on prey species populations and (2) the effectiveness of different strategies to reduce hunting to ecologically sustainable levels.

5. BOLFOR project activities involving work with local communities (both at Lomerio and with the seasonal laborers employed by the Moira concession) should make particular efforts to ensure that research is conducted and technical assistance provided in a manner most appropriate for local social conditions. BOLFOR technical staff directly involved with this aspect of the project should therefore receive training in appropriate methods of community participation, particularly Participatory Rural Appraisal.

6. Surface surveys of archeological artifacts, and information on culturally important sites (e.g., sacred lakes, hills, etc.) are <u>required</u> in any areas where the Project may be involved in construction or other activities disturbing existing habitats.

7. Monitoring and evaluation of the ecological impacts of project forest management activities should be carried out in the manner specified in section 5.0.

8. Amendments to this environmental assessment should be carried out in the manner specified in section 6.0.

Supplementary EAs

Future environmental assessments (technically, amendments to this environmental assessment) should be conducted for any planned project activities that are not explicitly addressed in this EA and that may have significant environmental impacts. This should include, but not be limited to, assessments of the environmental impacts of:

- Project activities that directly or indirectly promote forestry activities in sites other than the Moira concession or Lomerio community forests or involving silvicultural practices not described in this environmental assessment.

- Project activities that directly or indirectly promote the use of additional timber or non-timber forest products (NTFPs) in the Moira concession, Lomerio community forests or other selected sites. Excluded from these EAs should be applied research conducted to determine ecologically sustainable levels of product harvesting.

1.0 INTRODUCTION

1.1 Purpose and Scope of the Environmental Assessment

In FY 92 the Environment/Natural Resources Officer of the U.S. Agency for International Development (USAID) Mission in Bolivia carried out an Initial Environmental Examination (IEE) of the Sustainable Forestry Management Project (BOLFOR). A Positive Determination was reached. LAC/DR/E (The Regional Bureau environmental office) concurred with a July 16, 1992 memo (LAC-IEE -92-41). Because this project potentially involves commercial timber extraction in primary forests, the decision is in keeping with Section 533(c)(3)(B) of the FY 91 Foreign Assistance Appropriations Act which places certain restrictions on the use of AID funds for such purposes.

The goal of the proposed project is to reduce degradation of forest, soil and water resources and help conserve Bolivia's biological diversity. The purpose is to build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use. This will be accomplished through a tightly integrated set of activities including applied research, training, natural forest management demonstrations, value-added enterprises and marketing, and policy analysis and dialogue. If the project is successful, enterprises will implement Forest Management Plans for timber and non-timber forest products meeting national and international sustainability certification standards.

Composition of the EA team and the timing of its activities reflects the collaborative DAP process. During the preparation of a conventional Project Paper the EA team often begins its work once the project design is nearing completion. In the case of Sustainable Forestry Management Project the EA has been conducted parallel with the Project Paper preparation. EA team members have had direct input to the design of the project, particularly in the protection component with its strong emphasis on research and training.

EA team members were in the field together with the forester, marketing expert, economist and anthropologist participating in interviews, field observations and lengthy discussions on project design.

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Balancing the contractor contribution were three scientists representing an array of environmental concerns and competencies. They had no vested interest in the outcome of the design other than to assure its environmental soundness. According to the team's Terms of Reference (attached) all EA team members must approve the final product prior to submission. The independent team members included Dr. Peter Frumhoff, an animal ecologist and biodiversity specialist serving as a AAAS Fellow with AID/EID in Washington who had participated in the BOSCOSA EA, Dr. Howard Clark, a plant ecologist serving as the AID Regional Environmental Advisor for South America, and Dr. Jeannine Koshear, a geographer and AAAS Fellow with ethnobotanical experience from AID/R&D/ENR.

As the attached Terms of Reference indicate, a modified programmatic EA is suggested which combines site-specific analyses where activities are anticipated, with guidelines for supplemental EAs when precise locations of forest management pilot sites and the specific forest products to be the focus of project activities have been chosen. This will allow USAID to ensure the environmental soundness of future activities that arise during the "rolling design" of the project.

The EA field review was carried out in Bolivia from 14 March to 27 March 1993. The field review was organized and coordinated by the USAID/Bolivia Environment/Natural Resources Officer, Dr. Michael Yates and conducted by the team identified above.

An informal scoping process included meetings with Government of Bolivia (GOB), USAID/Bolivia, private sector, and non-governmental organization (NGO) representatives, and field interviews were conducted with industrial and indigenous community forest users within two proposed project sites in northeastern Bolivia in the Department of Santa Cruz. Field visits were made to forest harvest sites and intact forest areas during the period of 17-20 March, 1993. Specifically, the team visited intact primary forest (the Ríos Blanco y Negro Wildlife Refuge) and currently logged forest (the Moira timber concession) in the Bajo Paragua region of Santa Cruz, forested areas logged by Chiquitano indigenous communities near Lomerio, Santa Cruz, and sections of the Noel Kempff Mercado National Park near Flor de Oro, Santa Cruz. Overflights of the region provided additional information on current land use and vegetation. Analyses of results based on these field visits, meetings, interviews and a review of existing literature were compiled by the EA team and form the basis for the observations and recommendations presented in this report.

1.2 USAID Environmental Policies and Regulations

All AID programs are subject to a clearly defined set of environmental mandates. AID's environmental regulations are modeled on the U.S. National Environmental Policy Act (NEPA), authorized by Congress in 1969, and subsequent guidelines developed by the U.S. Council on Environmental Quality (CEQ). The environmental policy for AID is specified in federal regulations CFR 22, Part 216, dated October 9, 1980. In summary, this legislation requires USAID/Bolivia to:

- Ensure that environmental consequences of AID-financed activities are identified and considered by both AID and the host country prior to a final decision to proceed, and that appropriate environmental safeguards are adopted within the project.

- Assist developing countries in strengthening their capabilities to appreciate and effectively evaluate the potential environmental effects of proposed development strategies and projects, and to select, implement, and manage effective environmental programs.

- Identify all impacts on the environment resulting from AID's actions, including those aspects of the biosphere affecting endangered species (Section 216.5) which are the common and cultural heritage of all humanity.

- Define environmentally limiting factors which constrain development, and identify and carry out activities that assist in restoring the renewable resource base on which sustained development depends.

Section 533(c)(3) of the 1991 Foreign Operations Appropriations Act prohibits the use of economic assistance funds for "any program, project or activity which would result in any significant loss of tropical forest; or involve commercial timber extraction in primary tropical forest areas". The act requires AID to make certain findings or determinations before supporting any activities that could directly or indirectly affect tropical forest conditions. Specifically, Section 533 requires AID to complete an environmental assessment which would accomplish the following:

- Make specific environmental findings and disclose environmental impacts on tropical forests.

- Determine whether impacts are of a significant nature.

- Determine whether commercial timber extraction will occur in primary tropical forest areas.

- Identify potential impacts from proposed activities on biological diversity within the affected area.

- Demonstrate that all timber extraction will be conducted according to an environmentally sound management system which maintains the ecological function of the natural forest and minimizes impacts on biological diversity.

- Demonstrate that the activity will contribute to reducing deforestation.

1.2.1 Tropical Forest Issues Addressed in the EA

The EA for the Sustainable Forestry Management Project is structured to address the Congressionally mandated concerns outlined in Section 1.2 above and to recommend measures which may need to be included in order to minimize potential adverse environmental impacts of project activities. The EA combines a site-specific focus on two forest management units with an overview that provides the reviewer a perspective on what activities are anticipated and how the project is likely to proceed over the next seven years.

The EA specifically addresses small plot research in tropical forests. It is important to note that none of the major forest management demonstrations and Forest Management Plans described in this EA nor any activities requiring supplementary Eas will take place during the first year of the project. Once the project is established in the field, the team will organize and direct small plot and species specific research, inventories, and feasibility studies. Once discrete packages of information have been developed which show promise as contributions to sustainable forest use, they will be subjected to a supplementary assessment before demonstration, training and dissemination activities begin.

Impacts on tropical forests of small plot research on such topics as tree felling, log extraction, and silvicultural treatments addressed in the EA include:

- Impacts on the sustainability of forest resource use
- Impacts on plant and animal population

1.2.2 Categorical Exclusions

Part 216.2(c) lists several activities which may be categorically excluded from EA requirements. Examples relevant to the BOLFOR project are:

- Research affecting the physical environment but limited in scope, carefully controlled and effectively monitored.

- Controlled experimentation confined to small areas and carefully monitored.

- Training and technical assistance except when the environment is affected as in the case of the construction of facilities.

Because this project will directly and indirectly affect the tropical forest, it has been determined that this EA will address small scale research and experimentation. Supplementary EAs will explicitly address training, demonstration and technical assistance to

forest users who will be designing and implementing sustainable Forest Management Plans with project assistance.

1.3 The Sustainable Forestry Management Project

Goal. The goal of the proposed project is to reduce degradation of forest, soil and water resources and help conserve Bolivia's biological diversity.

Purpose. The purpose is to build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use. This will be accomplished through a tightly integrated set of activities including applied research, training, natural forest management demonstrations, value-added enterprises and marketing, and policy analysis and dialogue.

If the purpose stated above is achieved, the majority of the forests of Bolivia will be under legally defined and internationally certified site-specific management plans, either for the forest unit as a whole or for specific products. Progress will be measured by the establishment of commercial scale models of sustainable use based on research results.

Approximately ten percent of the national territory of Bolivia has been set aside for parks and protected areas. The MDS, FONAMA and CDF, as well as the national and international conservation community, recognize that preservation of the diversity of ecosystems and species extends to the other ninety percent of the national territory as well. This perspective is particularly applicable in Bolivia where nearly half the national territory is forested. The perspective is embodied in the implementing regulations of the "Pausa Ecológica". Some 22 million hectares are currently under forest concession for the extraction of timber with overlapping concessions in some areas for products such as palmito, Brazil nut and rubber. It is the challenging premise of this project that sustainable management of lands suitable for forestry will result in:

- The maintenance of a flow of timber and non-timber forest products competitive with returns from conversion of the land to other uses.

- The maintenance of a significant amount of biological diversity, ecosystem structure and other values of importance to society.

Caveat. A conditionality on the sustainability of forest management from an ecological and social perspective will be enforced adherence to a combination of national and international certification requirements. Why this caveat? According to the 1992 World Bank Forest Sector Review, trees and wood prices tend to increase slowly, while real interest rates in Bolivia have been around 15-20 percent. As long as investing elsewhere is more attractive than allowing trees to grow, rapid depletion of marketable timber will continue <u>unless</u> constraints are enforced.

Site selection as a focus for the project design was based on a review of six candidate sites described by the Centro de Datos para la Conservación (CDC). The sites evaluated

were the Alto Madidi, Bosque Chimanes, Manuripi Heath, Bajo Paragua, Carrasco/Isiboro Secure, and the experimental forests of the Universidad Autónoma Gabriel René Moreno. After reviewing the information provided by CDC the project team made up of representatives from FONAMA, SENMA, MACA, CDC, USAID, PL-480 and the Chemonics Consortium selected the Bajo Paragua in the Department of Santa Cruz as the project's initial comprehensive pilot site. Subsequent to the screening process, a second site in northeastern Santa Cruz Department was added. This was Lomerio, an area of dry forest where the Chiquitano indigenous community has some 30,000 ha under management and has expressed interest in receiving training and technical assistance under BOLFOR.

Choice of a specific geographic area does not preclude the choice of other sites at later date or the implementation of specific, targeted activities (e.g. applied research) at other sites early in the project. This site-specific focus will allow the EA to explore in greater detail the potential impacts of project activities. Lessons learned during this process will help the implementation team to more precisely define subsequent assessment requirements as project activities are replicated or expanded into other areas of the Bolivian Oriente.

By choosing the two sites the possibility of analyzing others is constrained. However, the two sites are representative of a broad range of conditions. The sites offer the following range of conditions:

Moira	**Lomerio**
Large concessionaire	Organized indigenous community
Capital intensive	More labor intensive
Subtropical moist forest	Subtropical dry forest
Flat, soils from sandstone	Rolling, soils from granite
Fauna sporadically exploited	Fauna under constant pressure
Isolated from settlement	Amidst 32 settlements
600 km from Santa Cruz	<200 km from Santa Cruz

The sites are similar in that they are both on the Brazilian Shield and exhibit related soil/topographic constraints on commercial agricultural conversion. Both forests have been high-graded and subjected to sporadic burning. In this sense the forests are representative of millions of hectares of forest in Santa Cruz Department that are in need of ecological and economic rehabilitation. There is a real danger that such decapitalized forests will become eventual targets for conversion. These Pre-Cambrian shield forests do not represent forests found on better soils and under more humid conditions of the Andean front or Quaternary lowlands further east and north. Neither site represents "primary" forest (undisturbed, climax, virgin or primeval) in the Section 533(c)(3) sense. If the forests that more closely fit the primary forest conception are to be saved from the currently operative process of degradation, the project will need to establish a demonstration site in such forest.

1.3.1 Project Activities

The primary and supporting project activities listed below are described in detail in the Project Paper. The primary project activities include:

- Natural forest management
- Value-added enterprise development
- Marketing of timber and non-timber forest products
- Monitoring and evaluation

Supporting project activities include:

- Applied research
- Training and information dissemination
- Policy analysis and dialogue

In a project where capacity building plays a major role, activities involving Bolivian students, professionals and field technicians in research and training take on major importance.

Note: Several of the activities mentioned above are subject to Environmental Evaluation as part of the Project Paper and later in EA supplements when the activities are defined. The secondary activities (research, training and policy analysis) are normally categorically excluded from EA consideration, unless, as in the case of training in silvicultural methods, they may contribute to extraction of products from primary forests (see Section 1.2.2 for discussion of why research is included as part of this EA). These secondary activities have been designed to contribute to mitigation of environmental impacts associated with the primary activities of the project.

The activities below are particularly relevant to this or anticipated supplemental Eas.

Research and Training. So little is known about Bolivian forest ecology and management that it would be fruitless to recommend any but the most obvious changes in current forest management practices (e.g., directional felling to reduce logging damage) until the appropriate studies have been conducted. Although there are relevant data from other parts of the tropics, silvicultural techniques need to be thoroughly tested in Bajo Paragua and other sites before recommendations can be made in good conscience. This is exactly the goal of the BOLFOR project.

The dearth of trained Bolivian researchers necessitates combining research and training activities. Building the capacity to clearly identify environmental and social problems associated with forest management, to design and implement appropriate research projects, to analyze the resulting data, and to disseminate the results will together represent long-lasting contributions to the cause of forest conservation and sustainable use in Bolivia. Training will also be provided for the technical foresters, forest guards, and forest laborers (e.g., chainsaw operators) who are actually responsible for the well-being of managed

forests. To some extent the training of these practical foresters will depend on the results of research supported by the project.

To clarify the types of research needed to provide an ecologically sound basis for forest management in Bolivia, examples of fairly specific research projects are outlined below. To a great extent, however, the exact investigations needed will depend on the result of the initial studies; this is in keeping with the "rolling design" of the BOLFOR project.

Forest Management. During the design phase the team examined the management practices in parts of two forest operations. First was the 150,000 hectare Moira concession in the Bajo Paragua Production Forest Reserve in northern Santa Cruz. The concession has been under exploitation primarily for mahogany (*Swietenia*), tropical oak (*Amburana*) and cedar (*Cedrela*) since the establishment of a sawmill in 1983 and a veneer slicer in 1988. The overall status of the forest resource was observed, both from the air and on the ground. The second was the Lomerio community forest claimed by the Chiquitano indigenous group. They have a sawmill and exploit a number of the same species as Moira.

Note: Supplemental EAs will be prepared as needed for (a) commercial palmito harvesting in the Bajo Paragua if preliminary research indicates that this resource can be extracted sustainably, and (b) Chiquitano community forest management for timber and non-timber forest products in Lomerio south of Bajo Paragua. In both cases the approaches to environmental assessment and resource management are very similar.

Elements of the anticipated forest management activity include:

- **Applied research.** Forest areas of less than a hectare are chosen for the purpose of testing hypotheses concerning proper management practices. Typical activities include measurement and marking of trees for cutting, trimming of vines, marking of advanced regeneration of valuable species to assure damage is minimized during felling and extraction, directional felling, and liberation thinning.

- **Pilot area management.** Commercial scale interventions in the forest to extract timber and other products clearly require assessment. A thorough knowledge of possible management interventions that would contribute substantially to both sustainability and profitability must be gained before engaging in commercial scale pilot extraction activities. Prior to initiating interventions, a supplementary EA will address the forest management plan as designed. Of overall concern in supplemental EAs are activities that involve significant human/machine intrusion into the forest and activities that significantly affect flora and fauna, species richness and biological diversity, modify ecosystem structure and function and/or degrade soil and water resources. A brief profile of anticipated activities follows (see greater detail in Section 3.0). The project would first reach an accord with the GOB and the concession holder to allow the team to direct the full range of logging activities in a discrete block of the concession - from inventory to access road closure. Project directed logging conducted according to accepted certification guidelines will be compared with (a) parallel or sequential

uncontrolled logging by the concessionaire on a similar site, and (b) an unlogged control area of similar size and ecological characteristics. This comparison would involve essentially the same environmental, social and financial/economic assessment as will be carried out in support of the Project Paper and EA. The primary difference here is the greater intensity of effort over a longer period of time, with periodic follow up measurements. Closely linked will be intensive training and research activities.

This EA assumes that pilot areas in the Moira concession and the Lomerio community are chosen that are substantially similar to the areas where extraction was studied in March of 1993.

Value-added enterprise development and international marketing. It is a basic premise of the project that the greater the financial return that Bolivians are able to realize from forest resources the greater will be the incentive to maintain forest cover. Given the high cost of transportation, processing for export markets offers an effective means of adding value to timber and non-timber forest products assuming that certification and environmental regulations are enforced. Otherwise, mining can also occur. Value-added processing is closely linked with identifying, satisfying and expanding international markets. Given that only a few woods such as mahogany are valuable enough as logs or sawn wood to pay their freight, the project assumes that any expansion in the number of species used will also involve value added processing.

The potential benefits of an integrated processing and marketing effort include:

- Increased participation of small to medium scale enterprises
- Significantly increased employment per dollar of sales
- Increased revenue per cubic meter of wood or other products harvested

The successful implementation of the value-added/marketing component will impact the forest resource as a whole through increased demand, either overall or for selected species. It would be possible to attribute demands for a particular species of forest plant to the geographic range within which it is exploited, but no closer. Thorough studies will be made of each candidate species to determine the potential impact of its extraction on fauna and ecosystem structure. Minimization of impact is predicated in part upon achievement of ecological and economic sustainability in forest use through enforcement of national laws and/or compliance with international certification requirements.

Since the demands of value-added enterprises cannot be defined at this time, this EA will provide general guidance for environmental assessment during project implementation in Section 6.0. Indirect impacts are discussed in Section 3.2.4.

1.3.2 Project Outcomes Anticipated

The project expects to reduce both the conversion of forests to other uses and the degradation of standing forests and their associated soil and water resources. These overall

benefits will be directly or indirectly achieved through building Bolivian public and private sector capacity to manage and use forest resources sustainably. The following are some of the expected specific outcomes by major project component:

Research

- A capability to predict actual and potential timber stocking based on knowledge of the soil, climate and ecological process interactions that affect the distribution and productivity of particular species assemblages.

- A better understanding of how forest product management interventions affect biological diversity and how negative impacts can be minimized.

- An understanding of site-specific management interventions that result in significantly higher sustained production of forest products with reduced secondary impacts on forest ecosystems.

- A better understanding of the origin and role of fire in humid tropical forest as well as the ecological, economic and management implications thereof.

Training and dissemination

- A greater awareness on the part of local people, politicians and decision makers of the economic value and ecological importance of tropical forests.

- A cadre of foresters and related professionals trained at the Engineer or Masters level who will meet future needs in sustainable forestry.

- Mid-career foresters, biologists, social scientists and economists in government and industry trained through in-service courses to regulate and manage projects in sustainable forest management.

- Technicians, tractor drivers and chainsaw operators trained in field application of sustainable forest management practices.

Natural forest management

- Once appropriate strategies are identified through applied research and disseminated via commercial scale demonstrations and training, concessionaires will implement Forest Management Plans for timber and non-timber forest products meeting national and international sustainability certification standards.

- Reduced rates of forest conversion to other uses on lands best suited for forestry under Bolivian land capability classification.

- Reduced forest degradation by destructive logging practices through adherence to low-impact guidelines.

Marketing

- More diversified enterprises adding value to a wider range of timber and non-timber forest products.

- A significant increase in the value of forest products exported from sustainably managed forests over the life of the project.

Policy analysis

- A more open and effective policy dialogue among government institutions, the forest products industry, NGOs, indigenous groups, and the donor community concerning sustainable forest management.

- Effective support to implementation of policies contributing to sustainable forest management.

1.3.3 Sustainability

The vagueness of the concept of "sustainability" and its multiple definitions make the issue difficult and controversial. For the purposes of this EA, ecological sustainability and sustainability of timber harvest will be explicitly distinguished.

Ecological sustainability analysis is complex and the criteria upon which such analyses are based are not widely accepted. The criterion of biodiversity maintenance are discussed in Section 3.1.2. Briefly, it is not at all clear that the maintenance of species richness should be the major criterion upon which sustainability is judged; stands with equally long lists of species could be dramatically different in structure, composition, and ecosystem function. The other components of biodiversity, genetic and ecosystem diversity, are equally problematic and difficult to measure. The spatial and temporal scales at which sustainability should be assessed are also not clear. Should assessment be by stand (e.g., 100-1000 ha), by concession, or by forest reserve? At what population density should species be considered to have suffered irreparable damage? Populations of some long-lived species remain in managed areas but produce no young; over what time scale should population viability be assessed?

Ecological sustainability depends on the continued presence of all the species responsible for future forest ecosystem function. So little is known about the biology of even the most important commercial timber species in Bolivia that loss of any species of plant or animal should be avoided. Particularly important are the pollinators, seed dispersal agents, and the associated plant species upon which populations of these animals depend. *Swietenia*, *Cedrela* and *Amburana* have wind dispersed seeds and apparently are pollinated by insects, making them unlikely to be effected by over-hunting. Logging, hunting, and forest

fragmentation by roads, however, may result in the proliferation of small mammals that prey on seeds of these species insofar as hunting generally decreases populations of mammalian carnivores. For the other tree species for which Bolivian forest will likely be managed, even less information is available. Some have fleshy and presumably animal dispersed seeds (e.g., *Guarea* and *Calophyllum*). Others (e.g., *Cariniana* and *Tabebuia*) have large flowers that are probably pollinated by large insects, birds, bats, or non-volant mammals. Even the highly selective logging currently practiced in much of lowland Bolivia could have negative impacts on population stability of these species.

From the perspective of nutrient dynamics, forest management practices are not sustainable if they call for removal of greater quantities of nutrients then are released from weathering of soil parent materials or are deposited in rainfall, dust, and etc. over some "reasonable" period of time. Because wood generally has a low nutrient concentration and because logging intensities in Bolivia are light current harvesting practices are unlikely to result in biogeochemical sustainability. Calls for intensification of logging, however, need to be regarded in light of the resulting negative effects on nutrient budgets on what appear to be extremely poor soils.

1.3.4 Eco-certification

To the extent possible the BOLFOR project will use market forces to motivate change from destructive to less destructive timber and non-timber forest product harvesting practices. One already significant and growing market force springs from worldwide concern for the continued existence of natural forests and the continued supply of forest products. This concern is being manifested in an increasing number of tropical timber boycotts and in the emerging "green" consumerism. The threat that their forest products will not have access to markets in environmentally concerned parts of the world in one reason for the widespread interest of Bolivian forest product exporters in "eco-certification". Pronouncements by the Bolivian government that all timber will be harvested sustainably before 1995 (Pausa Ecológica) and the International Tropical Timber Organization's similar worldwide target for the year 2000 are contributing to the interest in eco-certification of Bolivian timber and timber products. Finally, at least some members of the Cámara Nacional Forestal and other forest managers see eco-certification as an attainable goal. Eco-certification also serves as an organizational theme for the BOLFOR project insofar as it incorporates forest protection, sustainable forest use, monitoring of the effects of forest management, and marketing of forest products.

Eco-certification programs are still developing but there is general consensus about the basic principles and criteria for forest management. Attainment of this consensus is in part due to the activities of the Forest Stewardship Council (FSC), an organization dedicated to monitoring and accrediting forestry certification programs worldwide. The principles of forest management endorsed and promoted by FSC and the eco-certification organizations that it represents are as follows:

FOREST STEWARDSHIP COUNCIL
PRINCIPLES OF FOREST MANAGEMENT
(Draft VI, October 1992)

Principle 1. Management Plan: A written management plan must exist which clearly states management objectives for each forest, the means for achieving these objectives, and provides for responses to changing ecological, social and economic circumstances.

Principle 2. Forest Security: The ownership of the forest must be clearly defined and documented, and management areas dedicated by the owners to permanent forest cover.

Principle 3. Social and Economic Benefits: Participating parties should receive an equitable share of the benefits arising from forest production activities.

Principle 4. Local Rights: The legal and/or customary rights of indigenous peoples and other long-settled forest-dependent communities affected by forestry activities must be protected, and forest management planning and implementation must provide for full and informed consent in relation to activities that affect them.

Principle 5. Environmental Impact: Forest management activities must have minimal adverse environmental impact in terms of wildlife, biodiversity, water resources, soils, and non-timber and timber resources.

Principle 6. Sustained Yield: Harvesting rates of forest products must be sustainable in the long-term future.

Principle 7. Maximizing the Forest's Economic Potential: Forest management should take into account the full range of forest products (timber and non-timber), and forest functions and services, and should maximize local value-added processing.

Principle 8. True Costs: The cost of forest products should reflect the full and true costs of forest management and production.

Principle 9. Appropriate Consumption: Forest production should encourage judicious and efficient use of forest products and timber species.

Principle 10. Forest Plantation: Plantations should not replace natural forest; they should explicitly augment, complement, and reduce pressures on existing natural forests.

Principle 11. Chain of Custody: The original sources and subsequent steps in the processing and supply chain must be documented to allow accurate product tracing.

The concordance between the FSC certification principles and the central theme of the BOLFOR project is nearly complete. The more detailed criteria and compliance guidelines of the certifying groups (e.g., Rainforest Alliance, or Green Cross Certification Company) will influence project-related forest management activities. Working towards the goal of eco-

certification provides an independent evaluation of project performance and will financially benefit those companies, indigenous organizations, and other forest holders who satisfy the stated criteria and become eco-certified. While there are a number of fairly substantial changes in forest use practices that need to be made before eco-certification is a possibility, Bolivian forest managers are actually closer to this goal than their colleagues in many other tropical countries. To lead the world in compliance in ecologically and socially-sound natural forest management would be a boon to Bolivian forest and forest product industries and would unite environmentalists and industrialists in a common goal.

1.3.5 Implementation Schedule

Phase I (First 12 to 24 Months). The project implementation will begin in July of 1993, at the peak of the dry season timber harvesting period. It can be assumed that the first two months will be largely spent setting up offices, establishing working relations with counterparts, and assembling supplies and equipment. Once the logistics of settling in and team formation is complete, the critical process of institutional coordination will begin. For example. This EA covers all anticipated activities during the first 18 months.

Research. Data gathering in support of hypothesis testing for priority topics will begin during the first two to four months and continue into the second year. Examples include:

- Measurement of the impact on plant and animal diversity and ecosystem structure of existing palmito, babassu and timber harvesting in the Bajo Paragua and Lomerio.

- Baseline data gathering on flora and fauna and key ecosystem parameters can begin early in collaboration with the herbaria, the WCS project and other institutions.

- Sites for field testing of forest management strategies for timber and non-timber products can be identified. Data on plant, animal and system impacts will be gathered to compare with controls.

- In collaboration with the marketing group, new non-timber forest products with a potential in the market can be identified for research into their regeneration and the impact of their removal on the rest of the ecosystem.

Training. Much of the training during Phase I will involve training in research methodology and followed by learning while carrying out research. Research leading to the Engineer degree or its equivalent will be focused on problems relevant to the project under close supervision of national and visiting experts.

By the end of six months the first contingent of Masters degree candidates will have been awarded fellowships for study abroad. These first BOLFOR Fellows will return in 12 to 18 months to begin thesis research on problems identified by the project.

Given that baseline data gathering, preliminary research, and non site-specific training will occupy much of the first year, little supplementary EA activity is expected during this period.

Note: Much of the initial research and training will focus on the protection side of the project to assure a higher probability of problem identification prior to investment of funds and credibility in forest management demonstrations. By the end of the first 18 months research should be well underway leading to the creation of demonstration site programs and training modules.

Phase II (24 - 48 months). The most dramatic addition to project activities during Phase II will the launching of demonstration and training activities.

Research. Research begun during Phase I will continue and new work will be initiated as needs for information are identified. Ecological, economic and social feasibility studies for various extractive activities and ecotourism will be carried out. Because processes and cycles in a tropical forest ecosystem are complex and may have long time constants, much of the research will continue throughout the project and hopefully be carried on beyond. The capacity of Bolivian institutions to carry out this research should be enhanced by the return flow of trained professionals returning from graduate studies abroad. Examples include growth and yield measures, succession following silvicultural treatments, changes in faunal composition and species regeneration studies. These activities will become part of the overall Monitoring and Evaluation program. Feedback from ongoing research and monitoring will be incorporated in the technical material being disseminated.

Toward the end of Phase II it is expected that activities being carried out in Santa Cruz Department will be replicated in other parts of the Bolivian Orient. This will necessitate replication of some protection as well as production-oriented research in new ecological settings. Support for some of this research will begin early in the project, for example, continuing support for the work underway in the Bosque Chimanes.

Demonstration and training. Supplementary EAs will be performed on individual, or coherently clustered, demonstration and training activities. Early activities will emphasize discrete themes (directional felling, extraction, etc.) certain to contribute lower impact logging. However, by the end of Phase II it is anticipated that commercial scale demonstrations of logging and non-timber forest product extraction with cooperating forest managers will be underway. These commercial scale activities will be subjected to in-depth EA treatment.

Demonstrations will be complemented by an integrated sustainable forestry curriculum. Each module will be free standing, but will contribute to an integrated package. Modules will be designed to be conducted in the field with an emphasis on learning by doing. The first field testing of the training module will be filmed by a professional videographer and a 45 minute video created to be used as an integral part of future courses and as a training film available to sustainable forestry teachers and practitioners.

The core curriculum can be divided into three component parts each with its set of training modules. They are listed below:

Tropical Forest Management

- Forest inventory and mensuration techniques
- Research methods in forestry and forest ecology
- Selection of management strategies
- Timber felling and extraction road construction
- Preparation of a forest management plan
- Assessment and monitoring for certification and EA:

Forest Product Utilization

- Milling—chainsaw, portable and conventional
- Wood technology and wood working
- Drying and finish milling
- Value added processing techniques

Forest Product Marketing

- Marketing organization and quality control
- Matching of markets with products and skills
- Business management

Phase III (36 months to End of Project). By the beginning of Phase III the project should have a good idea of what sustainable forest management looks like under specific site conditions in Bolivia. By this time the Pausa Ecológica and European Community deadlines for certification of sustainability of management will have passed. A broad spectrum of the forest products industry should be ready to accept and apply sustainable management techniques.

Research. Much of the research will be dedicated to refinement of knowledge about sustainable management and continued monitoring of activities.

Demonstration and training. Wide dissemination and replication of sustainable forest management will be the primary objective of Phase III. Achievement of success will depend on major participation of Bolivians in the process. Training of trainers will be necessary.

2.0 THE AFFECTED ENVIRONMENT

2.1 General Description

Bajo Paragua. The 270,000 km^2 Bajo Paragua region of northern Santa Cruz Department encompasses the Noel Kempff Mercado National Park on the east, the Bajo Paragua Production Forestry Reserve (including the 150,000 ha Moira concession) and the Rios Blanco y Negro Wildlife Reserve on the west. All three units are bordered on the south by the 15th parallel, south latitude. The entire area lies within the sub-tropical humid life zone. The annual rainfall is probably 1000-1500 mm decreasing north to south, with a mean annual temperature of 23-24°C. There is a marked dry season between May and October. No direct climatological data are available for the Bajo Paragua. The Forest Reserve and concession are below 500 m elevation.

This area of initial project focus represents a strikingly different environment from much of eastern Bolivia. The dominant feature is the Brazilian Shield with its ancient sandstones and granitic outcrops. Millions of years of weathering of rock that is poor in nutrients to begin with has given rise to a relatively flat landscape with nutrient poor and well to excessively drained soils, reddish to gray in color in the uplands, with clay pans underlying the wetland areas. Black-water rivers in the area are another indicator of extreme soil and water acidity, low cation-exchange capacity, and extremely low soil fertility. The existing cover is dominated by humid evergreen and semi-deciduous forests, with another 20 percent of the area in forested and herbaceous wetlands, shrubby termite mound savannas and bare granite outcrops. Due to the flat to rolling topography and well drained soils, logging concession roads are trafficable even in wet weather and cause relatively little erosion.

In regards to climate, averages tell only part of the story. Extreme conditions sporadically prevail—cold Antarctic air masses occasionally penetrate well into the tropics, El Niño related periods of drought and excessive rainfall occur as well as winds in excess of 100 km/hr. The extreme events may very well be correlated with the frequent incidence of fire. Periodic fires appear to be important components determining the structure and composition of these ecosystems, with verbal reports given to us of massive forest fires throughout the region in 1942, and more local fires in other years, some (at least) caused by lightning. These forests generally have been logged previously for mahogany (old sawn stumps are occasionally visible), which may increase susceptibility to fire through seemingly minor changes in humidity within the forests. It is essential for the Project to determine the fire history of the area, and the relative impacts of fire on commercially important species, and the impacts of Project forest management recommendations on increasing the likelihood of fire, in addition to the impacts of fire on all other ecosystem components.

Human occupancy of the shield area has been equally sporadic, leaving only ambiguous traces on the landscape. Personnel of the Moira concession mentioned the occurrence of ceramic artifacts, some large enough to be burial urns, and richly decorated vessels, in the area. In the Ríos Blanco y Negro Reserve, petroglyphs and ceramic artifacts have been found at Laguna Pajaral, near Río Blanco. The project area was apparently peripheral to the Jesuit influence of the 17th and 18th centuries. Strings of place names marking forgotten towns of the rubber boom give the illusion of human presence in northeastern Santa Cruz. The climatic and human history is sketchily recorded at best, even during this century. One can only extrapolate from relatively distant places such as Santa

Cruz and Trinidad. The rather scraggly forest that one finds today on the shield, and specifically in the Moira concession, reflects not only the logging since 1983, but also interaction of vegetation with poor soil, climatic extremes and fire during the last 200 years.

Lomerio. Lomerio refers to the area traditionally inhabited by over thirty communities of the Chiquitano people encompassing some 130,000 ha southeast of Concepción in Ñuflo de Chavez Province of the Department of Santa Cruz (16N, 62W). About 40,000 ha of this area has been proposed for a forestry concession.

The Lomerio area is also part of the Brazilian Shield formation with Pre-Cambrian granite/gneiss outcrops combined with metamorphics and some tertiary sediments. The topography and soil of the region vary with its geology. Near Concepción is a nearly flat plain of Tertiary sediments. East of Concepción is a more rolling plain; where soils have developed, they are derived from Precambrian Shield granite and gneiss. South and West of Concepción the geology is more complex with plains on Tertiary sediments and undulating areas on Pre-Cambrian granites. For the most part the soils are well drained and nutrient poor. Large granitic outcrops (Inselbergs) occur throughout the area but are particularly abundant in the southern portion of the area near San Antonio de Lomerio.

Based on data collected at the Concepción airport over the period of 1955-1990, the area receives an average of 1129 mm/year of precipitation, most of which falls during the September through April rainy season. The months of June, July, and August each receive less than 40 mm of precipitation. The maximum and minimum temperatures recorded were 38.1 and 3.0 C, respectively but the average temperature during the coldest months is 16.7 C.

2.2 Flora

Bajo Paragua. The Moira forestry concession, including other concessions now controlled by this group through purchase of wood processing plants and equipment, adjoins the Rios Blanco y Negro Wildlife Reserve. Floristic, faunistic, forestry and anthropological/sociological inventories and related studies are now being carried out in the 1,400,000 ha of this Wildlife Reserve, with funding from the PL-480 program of USAID/Bolivia and other sources. The $\pm$150,000 ha in the expanded Moira concession lies on the 15th parallel south latitude between the Noel Kempff Mercado Park and the Rios Blanco y Negro Wildlife Reserve.

Before the BOLFOR Project can establish a well-designed monitoring system to determine impacts of Project activities, studies similar to those being carried out in the Wildlife Reserve will be necessary to determine the baseline conditions of biological and non-biological ecosystem components that could be affected directly by Project activities and indirectly by changes in forest management practices encouraged by the Project. To rationally plan forest management programs, it is necessary to map the forest types and the distribution of commercially important species in the concession area, and in any other areas where the Project may work. Initial inventories should concentrate on forest communities containing mahogany (mara, *Swietenia macrophylla*), as Project research and demonstration

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activities will concentrate in these areas. The forestry and environmental/biological data are complementary, and both are necessary for successful implementation of the Project.

The terrain and biological communities of the wildlife reserve are apparently similar to much of the Moira concession. Because we know of no detailed studies of ecosystems and communities in the concession, the following information from the Wildlife Reserve will give some indication of the diversity of ecosystems and taxa in the Moira concession. Our two days of observations in limited parts of the concession were only sufficient to give general impressions of parts of the area. The Reserve information is taken primarily from locally established sources. This information is summarized in the following paragraphs.

The Rios Blanco y Negro Reserve is on the westernmost extension of the Pre-Cambrian Brazilian Shield (or Eastern Bolivian Shield). Surfaces in the extreme west and north of the Reserve are derived from Quaternary fluviolacustrine deposits, while areas close to watercourses are overlaid by the later deposits of current drainage systems. These surfaces are covered by latisols and duricrusts, which support distinctive vegetative cover visible in the commercial false-color LANDSAT images (O'Connor et al. 1987). In general, a thick, lateritic soil has developed in flat regions, and supports dense evergreen forest. Low scrub and brush grow on sandy soils and around the isolated bedrock outcroppings ("lajas"), while swamplands, arising from poor drainage through clay alluvium, occur in low-lying areas.

Detailed floristic studies are ongoing in the Reserve, using transects (500 x 2 m) and permanent 1 ha plots (line intersects in savanna areas), but most collections have not been identified to species as yet. Species new for Bolivia, or new for science, are being found. It is probable that endangered and rare taxa are relatively abundant in this floristically unique area.

In 34 forest inventory plots (500 x 20 m), no mahogany (mara, *Swietenia macrophylla*) was found, apparently due to prior logging in the area, and perhaps other factors (e.g., fire). Mahogany and cedro (*Cedrela* sp.) were only found in the southern part of the Reserve and in the Río San Martin zone. These species were in clustered distributions, forming mosaics in high and well-drained sites, although some isolated individuals were found.

Evergreen forest grows on high, well-drained soils underlain directly by the Brazilian Shield, with non-forested outcroppings of Shield granitics. This is the dominant vegetation type in the Reserve, growing in the thick soils of the peneplain. A marked difference in vegetational composition was noted between terra firme forest east and west of the Yacundá river. To the west, a dominance of the tree *Pourouma*, with herbaceous coverage of *Erythrochiton*, was present, while east of the Yacundá, in the larger part of the reserve, *Erythrochiton* was more or less absent, and replaced as the dominant herb by *Costus* and *Heliconia*. Common tree genera east of the Yacundá were *Chorisia, Cedrella, Zanthoxylum, Tabebuia,* and *Hymenaea,* and the palms *Maximiliana* and *Astrocaryum*. The vegetational differences in terra firme forest composition were, to some extent, reflected in differences in the bird species composition.

Two general forest types are distinguished in the Reserve: those on the Brazilian Shield, and those in the alluvial plains in the western parts of the Reserve.

In the Shield area, on lateritic soils with clay in depressions, the following five subtypes are distinguished:

Shield:
conspicuous: *Pourouma* and *Eritrochitum;*
upper stratum: *Ficus, Ceiba pentandra, Hymenaea, Aspidosperma, Cavanillesia;*
secondary stratum: *Inga, Pseudolmedia, Pourouma.*

Valleys crossing shield (higher diversity than surrounding forests):
characterized by palms *Euterpe, Socratea, Astrocaryum, Mauritia.*
important timber species: *Cariniana, Calicophyllum spruceanum, Cordia, Schizolobium parahyba.*

High forest on peneplain; <100 individuals/ha are >20cm DBH; lateritic, with local clays, in depressions are banks of sand:
economically important species: *Swietenia macrophylla* and *Cedrela*
other species: *Ficus, Terminalia, Cariniana, Hymenaea*
secondary stratum: *Inga,* Apocynaceae, *Pouroma;*
understory: dense lianas.

High floodplain forests; seasonally inundated up to 4 months; 2-3 m high, impenetrable underbrush of lianas, with *Bactris* and bamboos:
economically important species: *Cariniana, Ficus, Terminalia, Calophyllum brasiliense.*

Ridge and slope forest; crowns to 30 m high; primarily deciduous; twisted trunks in upper slopes; evergreen with a few deciduous on lower slopes, ridges have shrubs and spiny lianas; soils at foot of slopes are deep and humid, ridgetops have granitic outcrops:
characteristic taxa: *Caesalpinia, Tabebuia, Anadenanthera macrocarpa, Jacaranda, Hymenea*

Two types, flooded and non-flooded forests, are distinguished on the alluvial floodplains of water courses, both on clay or sandy clay soils.

- The non-inundated alluvial forests, on heavy clay soils, include several species of commercial importance, including *Hura crepitans*, *Terminalia* spp., *Calophyllum brasiliense, Cordia,* and *Cariniana.*

- The inundated alluvial and swamp forests are flooded 3-4 months per year; soils are clayey, with deficient drainage. Characteristic microreliefs are present in many of these areas, with irregular ridges or hillocks 30-50 cm high, 30-100 cm across.

The dominant tree species of commercial importance is *Hura crepitans*.

There are minor occurrences of savannas, marshes, palm-dominated forests, and distinctive aquatic plant communities. While not of commercial forestry importance, these are critical habitats for many species of plants and animals.

Lomerio. The region has a rich mosaic of vegetation associations of the Subtropical Dry Forest representing a transition zone between Amazonian and Chaco regions and the influence of different soils, topographic positions, and land use histories. Savannas predominate on severely drained upland soils throughout the region. Savanna-like vegetation also occurs in valleys subjected to seasonal inundation. The granite outcrops have their own peculiar vegetation, dominated by ground bromeliads and other herbaceous plants. The most likely locations of endemic species are on the granite outcrops. Semi-deciduous forest in the region develops on the more mesic sites where soil has accumulated and is transitional between the evergreen forests of the Amazon and the deciduous forests of the Chaco region. The canopy of this forest is fairly low, ranging from 12-18 m with a dense understory to about 6 m. Frequent canopy tree species include *Astronium urundeuva*, *Anadenanthera macrocarpa*, *Caesalpania* sp., *Cordia* sp., *Amburana cearensis*, *Schinopsis*, *Tabebuia chrysantha*, *T. impetiginosa*, *Pterocarpus*, *Phyllostylum*, *Peltogyne confertifolia*, *Centrolobium* spp., and *Terminalia amazonica*. In the understory there are occasional extensive colonies of bromeliads (*Pseudoananas paniculata*). Northwest of Concepción is an area dominated the palm *Orbignya phalerata* ("cusi" or "babassu"). More detailed description of the vegetation can be found in Killeen et al. (1990). There are obvious signs of fire and wind damage but apparently there are no data on either type of perturbation. Scattered through the region are small patches of agricultural land and pastures, both active and abandoned. Some of the forest shows signs of having developed in abandoned agricultural clearings. There are several small streams in the area and herb-dominated zones of seasonal inundation, but no large permanent water bodies.

2.3 Fauna

2.3.1 Faunal Inventory

Bajo Paragua. Faunal inventories do not currently exist for the Bajo Paragua project site, the Moira concession. However, the site is contiguous with and ecologically quite similar to the Ríos Blanco y Negro Wildlife Refuge where the vertebrate fauna has been recently inventoried (FAN and WCI, 1993). It is also adjacent to the Noel Kempff Mercado National Park, where the mammals and birds have been surveyed (Wallace and Painter, 1992). We therefore base our discussion of the project site fauna on these inventories, supplemented by our brief field observations and discussions with Dr. Andrew Taber, Wildlife Conservation Society. It is important to emphasize, however, that the diversity and density of fauna in the project site may differ substantially from these inventoried locations, for two primary reasons. First, a history of subsistence hunting and timber harvesting in the Moira concession has likely had a substantial though undocumented effect on wildlife abundance, distribution and diversity. Second, much of the forest habitat of Noel Kempff Mercado National Park is ecologically distinct from the forests within the Moira concession

and likely contains a somewhat distinct fauna. Nonetheless, there is undoubtedly some species overlap and individuals of some species may move regularly between the Park and project site.

The Ríos Blanco y Negro Wildlife Reserve and the Noel Kempff Mercado National Park contain highly diverse assemblages of mammals and birds. 70 species of mammals and 396 species of birds (329 residents and 67 migrants) have thus far been identified within the Reserve and 44 species of mammals and 232 species of birds have been identified within the boundaries of the National Park. 95 species of fish have also been identified within the Reserve and similar inventories of amphibians and reptiles are currently being compiled. Freshwater and terrestrial invertebrates have not been systematically described in either site.

Results of these preliminary inventories are of particular relevance to the proposed project. First, a number of the identified birds and mammals in both the Park and Wildlife Reserve are known to be endangered or threatened with extinction. Control of logging along streams and limitation on the cutting of food sources are the type of project activities that can minimize impacts on their local populations and should be particularly emphasized. Second, within the reserve there appears to be a marked negative correlation between the density of large mammals (e.g. Brazilian tapirs *Tapirus terrestris* and collared peccaries *Tayassu tajacu*) and the presence of logging activities. Visits to logging camps have produced clear evidence of subsistence hunting and this is undoubtedly the primary cause of this correlation (FAN and WCI, 1993). Similarly, bird species diversity in the Reserve is lowest at the only inventoried site known to have been logged within the past several years. This latter result may be largely due to logging-induced changes in forest structure, such as the increased opening of the canopy that is produced by the felling of trees and extraction of timber. The local abundances of bird species that require forest understory microhabitats may be particularly reduced by even quite selective logging (Thiollay, 1992).

Lomerio. The avifauna of Concepción have been recently and extensively surveyed by Davis (1992) and their abundance in the Lomerio project site is undoubtedly quite similar. Davis (1992) recorded 257 species, of which perhaps 70 percent are permanent residents, and noted that forest-dwelling species are particularly threatened by human alteration of their natural habitat, with more than half not observed in anthropogenically disturbed environments. The other fauna of the Lomerio project site has apparently not been systematically inventoried and there is no basis upon which to predict its similarity to Bajo Paragua or other inventoried sites in northeastern Bolivia. The only available data are anecdotal descriptions of local fauna gathered by the team during the brief field visit. Several local residents reported that, although Chiquitano people do hunt, there are cultural proscriptions against over-harvesting. They cite as evidence of this claim the continued presence of tapirs, peccaries, agoutis and several species of primates within the Lomerio forests. Impacts on wildlife populations of selective timber harvesting in the Lomerio communities is similarly undocumented.

The Chiquitano people are widely known for the wild honey that they collect and occasionally sell. Reportedly, they distinguish six bee species and actively protect nests and nectar-providing trees.

2.3.2 Fauna - Threatened, Endangered or Sensitive Species

Bajo Paragua. Several species that may occur within the Moira concession are recognized as endangered under the U.S. Endangered Species Act (CFR 50, Parts 17.11 and 17.12, dated July 15, 1991). Others are listed by the Convention on International Trade in Endangered Species (CITES) as Appendix I (threatened with extinction) or Appendix II (not currently threatened but may become so unless trade is regulated). Finally, some species not listed either by the ESA or CITES are recognized by experts in Bolivian wildlife as threatened with local extinction. Habitat mapping will be carried out for the first time by the project. Animals that may occur within the Bajo Paragua project site are listed below:

Scientific name	Common name	Status+
Mammals:		
Panthera onca	Jaguar	ESA - Endangered
Pteronura brasiliensis	Giant river otter	ESA - Endangered
Myrmecophaga tridactyla	Giant anteater	CITES Appendix II
Tamandua tetradactyla	Collared anteater	CITES Appendix II
Lutra longicaudis	Long-tailed river otter	ESA - Endangered
Felis concolor	Puma	CITES Appendix II
Felis wiedii	Margay	ESA - Endangered
Felis jagauroundi	Jagauroundi	ESA - Endangered
Allouatta seniculus	Red howler monkey	CITES Appendix II
Allouatta caraya	Black howler monkey	CITES Appendix II
Ateles paniscus	Black spider monkey	CITES Appendix II
Callathrix argentata	Silvery marmoset	CITES Appendix I
Cebus spp.	Capuchin monkeys	CITES Appendix II
Aotus spp.	Night or owl monkeys	CITES Appendix II
Saimiri sciureus	Squirrel monkey	CITES Appendix II
Speothus venaticus	Bush dog	CITES Appendix I
Chrysocyon brachyurus	Maned wolf	ESA - Endangered
Tayassu pecari	White-lipped peccary	CITES Appendix II
Tayassu tajacu	Collared peccary	CITES Appendix II
Tapirus terrestris	Brazilian tapir	ESA - Endangered
Priodontes maximus	Giant armadillo	ESA - Endangered
Birds:		
Harpia harpyja	Harpy eagle	ESA - Endangered
Falconidae spp.	Falcons**	CITES Appendix II
Accipitridae spp.	Hawks, eagles**	CITES Appendix II
Anodorhyncus hyacinthinus	Hyacinth macaw	Locally threatened*
Ara glaucogularis	Blue-throated macaw	CITES Appendix I
Ara macao	Scarlet macaw	CITES Appendix I
Psittacidae spp.	Parrots, macaws**	CITES Appendix II

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Reptiles:

Caiman latirostris	Black caiman	ESA - Endangered

+ Where species are listed both by the ESA and CITES, only the ESA listing is referenced.
* Wallace and Painter, 1992
** All species in these taxa not listed in CITES Appendix I are listed in CITES Appendix II.

Lomerio. Anecdotal reports of tapirs, peccaries and several primate species within the Lomerio forests suggests that these and perhaps other threatened, endangered or sensitive species occur there as well. The current lack of faunal inventories in Lomerio precludes an accurate assessment.

2.4 Land Capability and Use

Land capability assessment has a long history in Bolivia, derived in large measure from the system developed by Joseph Tosi of the Tropical Science Center in Costa Rica. Capacidad de Uso Mayor de la Tierra (CUMAT) is an NGO originally created by USAID to apply the TSC methodology in Bolivia. Capability represents the optimum sustainable use of the land under given levels of technology, capitalization and accessibility. When a capability map is overlain on an actual use map, areas of potentially destructive use and under utilization are revealed. In the case of the Bajo Paragua, and specifically the Moira concession, no maps of either capability or actual use exist.

2.4.1 Land Capability

Bajo Paragua. Topography ranges from flat to gently rolling. The dominant constraint affecting the use potential of the Bajo Paragua is the soil. Soil characteristics include infertility, excessive drainage, shallowness in the vicinity of granite outcrops and, paradoxically, over extensive areas soils with either a high water table and/or subject to annual flooding. In that soils of better structure and fertility exist in the Quaternary lowlands west and south of the Bajo Paragua shield area, there is little incentive to promote what would be ephemeral colonist settlement or highly capitalized crop or livestock production on these poor soils. The site is 600 kilometers from Santa Cruz de la Sierra, the nearest market and source of agricultural inputs - by dirt road. The combination of poor soils and isolation should slow the rate of colonization in this area.

This leaves forestry and ecosystem protection as the only viable uses of the area. After eliminating granitic balds, lakes, wetlands and at least two classes of grasslands one is left with forested lands which must be examined in greater detail to determine what areas can support economically viable forestry. The forest vegetation is described in more detail in the flora section above. Without more extensive field investigation it cannot be determined whether poor stocking in several areas is due to poor site conditions or to previous land use or fire history.

Lomerio. Areas of steep slopes and/or thin soils should be used for watershed protection or highly selective logging and production of non-timber forest products. More

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fertile soils of valley bottoms have potential for shifting agriculture or permanent agriculture with mulching. The highest potential over much of the area is forestry, agroforestry, and some controlled grazing.

2.4.2 Actual Land Use

Bajo Paragua. There are two user groups within the Moira concession that are representative of the Bajo Paragua region in general. The concession employs over 500 people during the peak of dry season operations of its sawmill and veneer facility. These people are engaged in locating and cutting trees, vehicle operation, veneer/sawmill operations and various support activities. Any area containing marketable concentrations of timber is subject to logging. Logged areas and areas with timber production potential will be mapped during project implementation.

Near the mill is the village of La Florida with 35 families. Some of the men are contract employees of Moira during at least half the year while others have agricultural clearings for subsistence and some sales to the mill. A herd of some 30 cattle graze on the runway and surrounding abandoned agricultural land. In proportion to the area of the concession, agriculture occupies a minuscule part. "Log hunter" contract employees and some of the villagers engage in hunting. The areas in which they operate and the impact on the fauna have yet to be determined.

Lomerio. Current land use involving shifting agriculture on lower slopes and forestry is sustainable at the current population density. More questionable is the extensive use of fire that extend savannas of unpalatable grasses and shrubby, fire resistant trees. The savannas are extensively grazed by cattle but the stock density is exceedingly low.

3.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVE ACTIONS

Current resource uses affecting the forest environment of eastern Bolivia include agriculture, livestock production, extraction of timber and non-timber forest products, and hunting. Within the Bajo Paragua Production Forest Reserve and specifically the Moira concession, only timber extraction and hunting are significant. This narrow range of human interventions is due to a combination of the unattractiveness of the poor Pre-Cambrian shield soils to colonists, the sparse resident population, the remoteness of the area from the settlement frontier, and firm actions by the concessionaire to remove people attempting to move in. At the second site, Lomerio, agriculture is relatively stable, hunting pressure is high and burning for pasture is a major cause of forest degradation. However, the Chiquitano community is dedicated to making sustainable forest management work.

This EA considers in detail two alternatives; "no project" and the project as designed. "As designed" has a very different connotation for the EA team in this project. All too often the EA team is presented with a development project designed by a team of economists, engineers, agronomists and foresters. If the EA makes a compelling case for modification, the process is at best slow, costly and often resented by donor and beneficiary alike. In the case of the Sustainable Forestry Management (BOLFOR) Project, the design and the EA

were part of an interactive process. The forester, ecologists, marketing specialists, social scientist and economist interacted in the field and contributed to a design which takes into consideration mitigative measures and the research and training needed to assure that such measures are as effective as possible. Where doubt exists, supplementary EAs are advocated. This EA serves to document the process of integrating environmental concerns in project design.

An alternative that warrants consideration is the use of project funds to support protection of tropical forests and wildlife. Maintenance of tropical forest cover and wildlife is a goal of the project, but one approached from a radically different direction. Protection presupposes protected status. Some 10 percent of Bolivia's national territory has park and protected area status, much of it in tropical forest. USAID, World Bank and other donors and NGOs are actively supporting Bolivia in its efforts to assure the integrity of areas now designated as parks and protected areas. This project seeks to maintain viable forest ecosystems in substantial areas of Bolivia's national territory not now in parks or ever likely to be. The mechanism is ecologically, economically and socially sustainable management of tropical forests for timber and other products. This approach is highly complementary with park protection. For example, the Moira concession abuts the Noel Kempff Mercado National Park and the Rios Blanco y Negro Wildlife Reserve. A managed forest will serve as a better buffer than pasture or small holder colonization.

The time is opportune for this project. Both Bolivia and the major international markets for tropical timber and non-timber products are in the process of being closed to all but products certified as being from sustainably managed forests. This project will encourage that process by thorough research on what constitutes sustainable management under different conditions, training in management and related fields, technical assistance and policy dialogue. The project will work in close coordination with Bolivian institutions seeking to implement the sustainable use provisions of the Pausa Ecológica, the Forest Stewardship Council, the International Tropical Timber Organization, and any other group seeking workable approaches to sustainable management of tropical forests.

Key issues to be addressed include:

- Impacts on forest ecosystems
- Impacts on plant and animal diversity
- Impacts on the sustainability of the forest resource

3.1 Impacts of the No Project Alternative

The "no project" scenario assumes that USAID does not fund a project dedicated to sustainable management of tropical forests. The scenario also assumes that neither the government of Bolivia nor another donor launches a similar project in the foreseeable future.

National scale impacts. The project has a strong orientation toward building the capacity of public and private institutions to sustainably manage Bolivia's tropical forests. Without the research, training and demonstration envisioned in the project, Bolivia will find it more difficult to meet the 1995 Pausa Ecológica goal of having all lumber exported be from forests certified as being managed sustainably. The project includes certification of finished wood products and non-timber products as well. Without the strong production and conservation complementarity that assures sustainability while increasing the value of the forest through broadened markets, pressures to convert the forest to other uses will increase.

Site-specific impacts. Specific impacts of the no project alternative are discussed for the Moira concession in the Bajo Paragua and the Lomerio area southeast of Concepción, both in Northeast Santa Cruz. The focus is primarily on the impacts of uncontrolled logging, burning and hunting on forests, biodiversity and sustainability of resource use.

3.1.1 Impacts of Current Logging Practices on The Forest Ecosystem

Bajo Paragua. There are apparently no data from Bajo Paragua Forest Reserve on the effects of logging on forest structure, composition, ecosystem function, or the sustainability of resource use. On the basis of the EA team's visit to the Moira Concession in Bajo Paragua, however, some of the effects of logging can be described. Furthermore, to the extent that the conditions in Baja Paragua resemble those in Chimanes Forest Reserve, effects of current logging practices in the former can be assumed from studies conducted in the latter by R.E. Gullison et al. Determining the nature and extent of logging effects in Bajo Paragua is one of the goals of the BOLFOR project.

Current harvesting practices in Bajo Paragua are obviously not sustainable from a wood production point of view. The disregard for future productivity is nearly complete. The claim by the Moira Concession staff that seed trees are retained is only true insofar as hollow or otherwise non-commercial trees are not extracted. No silvicultural treatments are currently in use that would increase stocking of commercially valuable trees or increase the growth rates of the smaller trees that survive logging.

Most Bolivian lowland forests have apparently already been logged at least once. In the Moira Concession, the last round of logging occurred about 10 years ago; now they are extracting trees that were missed, others that have grown to harvestable size, and species that have increased in commercial value during the intervening years (e.g., *Amburana*). The next round of logging will probably target more species, poorer quality logs, and smaller trees. From either a commercial or an ecological sustainability perspective, none of these anticipated changes are positive.

Forest management is currently not practiced in the Bajo Paragua (nor elsewhere in Bolivia to the best of our knowledge); the forest is simply "high-graded" or "creamed" for high value logs. In the Moira Concession, 8-10 teams of about 10 contracted tree-finders each search the forest for trees more than 60-70 cm in diameter at breast height (1.4 m; DBH) of *Swietenia* ("mahogany" or "mara"), *Cedrela* ("tropical cedar" or "cedro") and *Amburana* ("tropical oak" or "roble"). They inscribe their initials on the trees to be cut and are paid by the number of trees they find. Relocating the trees is facilitated in some areas by a 200 x 200 m grid of cleared lines through the understory. During the dry season the same teams fell the selected trees and direct the skidder drivers to their locations.

The felling, timber extraction, and timber hauling practices in the Moira Concession cause more damage than is either necessary or cost effective. This statement could be applied anywhere in the Bolivian Oriente where logging is taking place. Commercial trees are felled without regard to the location of skid trails or the distribution of advanced regeneration (seedlings, poles, or small trees) of commercial species. Unfortunately, because directional felling is not practiced, before many of the logs can be skidded to log landings they must be rotated using the blade of the skidder. Because vines connecting the tree to be felled with neighboring trees are not cut prior to logging, trees not directly hit by the felled tree often suffer mechanical damage. Given the concessionaire's estimation of the proportion of hollow trees of commercial species (more than 50 percent), mechanical damage and subsequent attack by fungi, termites, and other wood-eating organisms represent a serious threat to long-term economic viability of timber harvesting. It should be pointed out, however, that the major factor contributing to this high proportion of hollow trees is probably fire.

Unnecessary damage to the forest and inefficient utilization of the trees felled is also due indirectly to the policy of assessing taxes. The current policy makes it to the logger's distinct financial advantage to extract from the forest only the choicest logs. Substantial quantities of valuable timber are left to rot on the forest floor or at log landings. The policy component of the project will promote alternative revenue collecting alternatives and incentives such as technologies for adding value to wood not suitable for sale as sawn timber.

Forests damaged by logging in this manner are prone to fire and weed infestation. Logging slash on the forest floor constitutes fuel for the fires that apparently occur quite frequently in the Bajo Paragua area. The presence of numerous careless cigarette smokers and camp fires in the area increase the likelihood of ignition; the added fine fuels (logging slash) increase fire intensity. Canopy opening also promotes the proliferation of the already abundant vines. Once vines have come to dominate an area, tree regeneration may be postponed for decades. On the other hand, it should be pointed out that large canopy openings are apparently required for the successful regeneration of *Swietenia*.

One mitigating factor for logging in Bajo Paragua is the low stocking of currently marketable timber species. Although reliable data on stocking in the area are not available, it appears that on average, not more than one tree is extracted per hectare. On the basis of the logging damage model for Chimanes Forest Reserve, felling and extraction of 1 tree per hectare will result in about 20 percent of the forest being damaged. This estimate includes

neither the potential effects of fire nor the subsequent proliferation of vines and other weeds that with time spread outward from areas directly affected during logging.

We anticipate that the intensity of logging in Bolivia will increase in the near future. Many tree species that are harvested in Brazil are currently not harvested in Bolivia, apparently due to higher transport costs. As markets expand and stocks of well-known and high-valued species are depleted, these other species will likely be harvested in Bolivia. Increased harvesting intensity will greatly increase logging damage, especially if current uncontrolled practices continue.

3.1.2 Impacts of Current Logging Practices on Plant and Animal Diversity

Bajo Paragua. Although data are not available on the effects of logging on plant and animal diversity in Bajo Paragua, studies conducted elsewhere in the tropics allow estimation of the likely consequences. The major problem with using data from forests in other countries is that logging intensities in Bajo Paragua are much lower than the norm.

Although the proportional representation of species may change dramatically, logging rarely results in the extinction or even local extirpation of plant species. In Bajo Paragua, because average logging intensities are very low and only large trees of primarily three species are extracted, the effects on plant species diversity are also probably correspondingly low. In contrast, logging undoubtedly has a substantial effect on population structures of both commercially valuable and light-demanding weedy species. Weeds are particularly abundant along skid trails and extraction roads in Bajo Paragua. Also, removal of most of the seed-producing trees of the commercially valuable species undoubtedly influences the viability of their populations but research is needed to determine the extent of these effects.

The effects of selective logging on animals depends on the species concerned and whether or not hunting is practiced. The characteristics of the tree species extracted is also likely to be an important determinant of the impacts of logging on animal populations, but this has been little studied. In Bajo Paragua, however, three of the most valuable tree species (*Swietenia*, *Cedrela* and *Amburana*) are apparently not widely used by wildlife for food; the extraction of other species considered for marketing (e.g., *Ficus* sp. "bibosi") may very well have a much greater effect. Bibosi and other candidate tree species will be subjected to an assessment of the potential impact of their removal on ecosystem processes and particularly on fauna. Furthermore, tree species felled as part of the logging operation (e.g., in the process of road construction) can be important to wildlife as food resources.

The impacts on fauna of unaltered practices by the Moira concessionaire are difficult to gauge in the absence of clear documentation, but they are likely to be severe for some and perhaps many species. These impacts may take several forms:

- First, the concessionaire employs seasonal laborers ("tree-finders" or "contratistas") to search for commercial tree species throughout large areas of the concession. Tree-finders later return to cut the trees they located. Eight to ten teams of 8-10 men plus women and children each year spend

several months at a time in the forest. Although wildlife hunting is illegal, they are not provided with alternative sources of animal protein, carry guns, and likely engage in subsistence hunting at a level that may have a substantial negative impact on wildlife populations (Taber, pers. comm.; Taber and Rumiz, 1993).

- Second, the current practices of commercial logging fail to incorporate harvesting techniques that would help minimize impacts on wildlife (e.g., the protection of streamside vegetation and trees that produce fleshy fruits during seasons of low fruit production in the forest).

- Finally, current logging practices appear to be decreasing the population of commercial timber species of harvestable size such that over time there may be an increased incentive to convert forest to other land uses (representatives of the Moira concession spoke of plans for citrus production and cattle ranching), to illegally cut timber outside the concession within the boundaries of the adjacent national park, to increase the number of tree species harvested within the concession and to cut trees below the minimum cutting limit. Such changes in forest use which may reasonably be expected to arise from the concessionaire's currently unsustainable harvesting practices would have serious repercussions for wildlife.

Animal species not actively sought by hunters may also be affected by selective logging in Bajo Paragua. Logging of 3 trees/ha in French Guiana, for example, resulted in the loss or sharp decrease in populations of 42 percent of bird species; even 10 years after logging the bird populations had not recovered (Thiollay 1992). Cox and Taber (unpublished) report that in the Rio's Blanco y Negro Wildlife Reserve in Bajo Paragua Forest Reserve (west of the Moira Concession), logged forests have 30 percent fewer bird species than nearby unlogged forest. Determining the effects of current logging and hunting practices on animal populations and the extent to which these effects can be reduced is one of the goals of the BOLFOR project.

This reduction of forest wildlife populations, whether through hunting, timber harvesting, or forest fragmentation can also have severe and largely unrecognized effects on the forest ecosystem. Invertebrate and vertebrate fauna play direct and essential roles in the structuring and regeneration of tropical forest vegetation through herbivory, pollination, seed predation, seed dispersal and nutrient decomposition and cycling. Often these roles are highly species-specific, as when a forest tree is pollinated by only one or a few species of insects, birds, or bats. Some authors have also suggested that large mammalian predators such as jaguars and pumas may have a substantial indirect effects on the structure of forest vegetation by decreasing the populations of seed and seedling consuming rodents and other small mammalian herbivores (Terborgh, 1992; Taber & Rumiz, 1993). Such effects will need to be better understood for ecologically sustainable forest management practices to be devised.

Lomerio. It is difficult to judge the impact on fauna of current forest management practices by members of the Lomerio communities. Community members claim to engage in sustainable levels of subsistence hunting, but this has not been systematically evaluated. Similarly, the impacts on fauna of current timber harvesting practices is undocumented.

3.2 Consequences of the Project as Designed

The project supports sustainable logging and extraction of non-timber forest products with full knowledge that any intervention will result in some disruption of ecosystem functions and loss of biological diversity. However, when compared with the "no project" alternative the project is designed to have a markedly lower impact on natural system values in two distinct ways.

First, significantly increasing the economic value of the forest (and public awareness thereof) will result in:

- Those who control public or private forested land not in production reserves making the decision to manage the forest rather than convert it to other uses.

- Those who have concessions or use rights to production forests vigorously defending that economic resource against illegal intrusions.

Second, through research, training, demonstrations, and information dissemination the project will assist public sector institutions and forest based industries in defining and implementing forest management plans that meet the letter and spirit of national and international certification requirements.

In contrast, the no project alternative would leave the Bolivian public and private sector at odds over how to technically carry out sustainable forest management under the economic threat of mounting international pressure. Continuation of uncontrolled forest exploitation in narrowing world markets will increase the probability that forest lands will be converted to other uses.

An important element of the project is its high profile. Other countries, donor agencies, the scientific community, and NGOs are watching for results. The opportunity exists under the unique conditions prevailing in Bolivia to demonstrate sustainable management approaches for timber and non-timber forest products. The project will participate in several research and information exchange networks, publish results in the international literature, and create an integrated series of video-based training modules on forest management and related topics for pantropic distribution.

3.2.1 Impacts of Project Activities on the Forest Ecosystem

Bajo Paragua. The Bajo Paragua Forest Reserve is a complex of moderately dense forest, cerrado (scrub forest) and savanna on thin soils, swamps, and marshes, and rock outcrops (inselbergs). Although project activities will focus on the forests, the distribution of

vegetation and soil types needs to be ascertained. Furthermore, among the forested areas are sites that have been logged once or several times, burned areas, stands well stocked with plant species important to wildlife, buffer strips along water courses and lakes, etc. Other forest reserves in Bolivia are equally complex but expertise in mapping and forest inventory is not yet well developed. The forest manager in the Moira Concession, for example, has a satellite image that has been neither interpreted nor ground-truthed; he seems to rely on the memory of his field crews to decide which areas to target for logging.

The BOLFOR project will support the development and implementation of a remote-sensing forest classification system. Vegetation maps based on infra-red airphoto or video interpretation with substantial ground-truthing will be developed for Bosque Chimanes and then implemented in Bajo Paragua Forest Reserve. The advantage of the Bosque Chimanes site is that 14 all-species 1-ha plots have already been set up by R.E. Gullison and associates. Vegetation mapping activities are not anticipated to have any deleterious environmental impacts but will provide a firm basis for efficient and ecologically-sound forest management planning.

Using the vegetation map of the Moira Concession, inventory methods will be developed and implemented. Along with collecting data on timber stand volumes, population structure, and tree species composition, teams of researchers using the same inventory grid will collect basic data on fire and wind-storm history, indications of previous human activities, soil, and wildlife populations. With these extensive data in hand, sites can be more rationally selected for more intensive study.

The project focus is on sustainable forest management and consequently much of the research will revolve around management techniques. The silvicultural studies outlined below will be complimented by studies on plant and animal diversity (described in Section 3.2.2) and on the sustainability of resource use (Section 3.2.3). The silvicultural research proposed is divided into three interrelated components: felling, extraction, and stand improvement treatments.

3.2.1.1 Studies on Felling Damage

When a tree falls (or is felled) in the forest it invariably and unavoidably damages its neighbors. Studies in other parts of the tropics indicate that felling damage can be substantially reduced by cutting woody vines on the tree to be felled prior to logging and by directing its fall so as to reduce damage to potential crop trees and to facilitate extraction (i.e., to avoid having to rotate the log prior to skidding).

Research in the Moira Concession on the effects of pre-felling vine cutting on the number of neighboring trees damaged will be carried out on single trees as well as in replicated 5-10 ha plots in which a variety of silvicultural treatments will be imposed. Vines more than 2 cm dbh growing in the crowns of the trees to be felled will be cut at least 6 months prior to logging to ensure that they break easily. Labor costs and potential silvicultural benefits (i.e., ancillary damage) will be assessed. Because most uncut vines are expected to survive falling, resprout, and proliferate in logging gaps, the replicated

permanent 5-10 ha plots (reduced impact vs. conventionally logged) will allow determination of the effects of pre-felling vine cutting on post-felling vine density. The effects of this treatment on the animal community will also be assessed.

The hypothesis that directional felling results in reduced damage to potential crop trees will also be tested. Again labor costs will be recorded and a cost-benefit analysis conducted. Studies on directional felling in Suriname, Costa Rica, and Malaysia have indicated reduced logging costs from directional felling because skidding time is substantially less when logs do not have to first be re-positioned. Whether this is the case in Bolivia remains to be seen; the necessary studies will be carried out in 5-10 ha plots paired on the basis of number merchantable trees and logged either with or without directional felling. Training of sawyers in directional felling techniques will be provided by the project.

3.2.1.2 Log Extraction Methods

Efficient skid trail layouts and the use of cable winches have been shown to result in reduced logging damage. In Bosque Chimanes, for example, Gullison and Hardner (in press) found that the total area of forest damaged in skid trails could be reduced by 25 percent had their locations been more efficiently determined. In other parts of the tropics and presumably with higher logging intensities in Bolivia, even more substantial damage reductions are possible with well designed skid-trails. If instead of driving all the way to the log skidder operators used their cable winches for the last 25-30 m, forest damage could also be reduced.

Members of the BOLFOR forestry research team will conduct studies on current log extraction methods and on the reduced impact logging methods described above. This research will be carried out in the replicated 5-10 ha plots used for studies of felling damage. Once again damage as well as costs will be monitored.

3.2.1.3 Effects of Silvicultural (i.e., Stand Improvement) Treatments

Although controlled felling and timber extraction are major components of most ecologically-sensitive forest management strategies, a multitude of additional silvicultural treatments can subsequently be prescribed. Because the regeneration requirements of the tree species for which the forest is to be managed are for the most part unknown, it seems advisable to begin with stand improvement treatments that do not greatly effect stand structure. One such treatment called "liberation thinning" has been extensively used in Southeast Asia, and tested in several forests in Latin America, as well as in one area in Santa Cruz Province (Lomerio). This technique basically consists of removing trees overtopping potential crop trees by felling, girdling, or treatment with arboricide. No trees are killed unless they are directly competing with the selected potential crop trees. Girdling (= ring-barking) is carried out with an axe; girdled trees fall apart piecemeal over a 1-2 year period and hence do little damage when they finally topple over. This technique is presently being used in the Lomerio forest management project but has not yet been thoroughly tested for its silvicultural benefits, labor costs, or effects on other forest organisms.

The light-demanding trees species generally require more severe silvicultural treatments than liberation thinning. Felling of an average merchantable size canopy tree, for example, opens a 110-200 m2 canopy gap and favor the advanced regeneration of moderately shade tolerant species. If the forest is managed for more light-demanding species, larger openings will need to be opened. Regeneration clearings can be in narrow strips or in small patches. In either case the costs are higher than in liberation thinning (unless smaller trees of a variety of species are marketable) and the hazard of weed proliferation is greater. When basic ecological data on trees in Bajo Paragua are available, the project will conduct experiments with different "monocyclic" silvicultural systems.

3.2.2 Impacts of Project Activities on Plant and Animal Diversity

Bajo Paragua. The BOLFOR project proposes to engage in several activities that may affect wildlife within the Moira concession. First, several natural forest management research plots of ca. 0.5 ha to a maximum of 10 ha each will be established to examine the effects of silvicultural treatment on the growth and regeneration of commercial tree species. Silvicultural treatments will include measures to minimize collateral damage to unharvested trees (e.g. the cutting of vines that connect trees to be harvested with other trees and directional felling) and measures to enhance the regeneration of trees of commercial species (e.g. the removal of trees of non-commercial species near immature mahogany trees in order to reduce competition for light and nutrients). Second, vegetation maps of the Moira concession will be developed in order to determine where forest suitable for timber production is located. Third, methods to reduce the risk of fires in the concession will be assessed and recommended to the concessionaire. These may include research on fire origins, development of training modules in fire prevention and control, and establishing a trained concession fire brigade.

The forestry activities carried out on the small research plots will have negligible effects on wildlife. If, however, these practices are adopted by the concessionaire (as might be reasonably expected if they enhance the rate of timber production per unit area), then their potential impacts should be evaluated on a larger scale. While vine-cutting and directional felling are likely to have quite benign effects on fauna relative to current practices, liberation thinning may have a substantial negative impact if it is adopted more widely within this concession. A negative impact may arise if non-commercial trees provide important food resources or nesting habitat for forest-dwelling fauna, or if their removal more generally alters the forest habitat (Thiollay, 1992; Crome, 1992). The key issue is the scale and intensity at which liberation thinning takes place, with the extent of impact positively correlated with the number of trees removed per hectare and the number of hectares of contiguous forest in which trees are removed. The effects are difficult to gauge, but should be carefully assessed during a supplementary EA before project activities directly or indirectly encourage liberation thinning by the concessionaire.

Vegetation mapping will allow the project to identify areas of commercially productive forest and to make recommendations to the concessionaire about where to concentrate tree-finding and logging efforts. Since subsistence hunting by tree-finders/loggers is likely the primary cause of wildlife loss in Bajo Paragua forests, vegetation

mapping might have a positive impact on wildlife populations if its results lead the concessionaire to hire fewer tree-finders to spend less time in a more circumscribed area of the forest. The control of anthropogenic fire within the concession may also have positive benefits for wildlife.

Finally, several activities that may be undertaken by the BOLFOR project have the potential to enhance wildlife conservation within this logging concession and in other managed forests in Bolivia (Taber and Rumiz, 1993). These include:

- The collection of baseline data on wildlife abundance and diversity within the concession.

- The assessment of wildlife use by subsistence hunters within the concession to evaluate (1) the impact of hunting on prey species populations and (2) the effectiveness of different strategies to reduce hunting to ecologically sustainable levels.

- The identification of "keystone" species (e.g. *Ficus* spp.) and habitats (e.g. streamside corridors) for wildlife within the concession and the incorporation of their protection into recommended forest management plans.

- The monitoring of the impacts of different timber harvesting regimes (e.g. liberation thinning on pre-felling vine cutting) on wildlife populations.

Such research and monitoring will be essential if the project is to determine the conditions under which tropical timber can be extracted in an ecologically sustainable manner.

Lomerio. The BOLFOR project currently plans to provide the Lomerio communities with technical assistance on fire prevention harvesting methods and research techniques. These activities are likely to have benign or positive impacts on wildlife populations. The project may wish to further assist these communities to minimize the impacts of their current selective timber harvesting activities on fauna by providing them with additional training, for example, in the identification and protection of keystone species and habitats.

3.2.3 Impacts of Project Activities on Sustainability of Forest Resource Use

Project activities will have impacts on forest resource use, both direct and indirect. Obvious causes of impacts will be forest management plans promoted by the project and certified under yet-to-be defined mechanisms. How to minimize the impact of logging, extraction of non-timber forest products, and related activities such as hunting are the focus of most of the project design and this EA.

3.2.4 Indirect Impacts of Value-added and Marketing Activities on Sustainability of Forest Resource Use

One major goal of the BOLFOR project is to help develop sustainable forest management practices. Current practices are clearly not sustainable in terms of timber yield from harvested species; ecological sustainability is likewise unlikely. Research sponsored by the project will provide the ecological information necessary to design sound approaches to forest management, will develop appropriate silvicultural methods, and will test these methods on both experimental (e.g., 5-10 ha plot) and commercial scales (e.g., 1,000-10,000 ha). Timber yield will be monitored as will the effects of harvesting methods and stand improvement treatments on both plant and animal communities, and ecosystem properties.

If the effects on a tree population of a harvesting regime and associated silvicultural treatment are sustainable, this is equivalent to saying that population size does not tend to decrease over time. To make such a claim data are needed on reproductive output, seed predation, germination, establishment, growth, and survival. There are a number of accepted short-cuts but collecting the requisite data is nevertheless a major undertaking involving a number of interrelated studies that will be conducted over the life of the BOLFOR project. Population studies will be conducted on currently marketable timber species, timber tree species with potential, and non-timber product producing species (e.g., palms harvested for their edible terminal bud). The types of studies needed to assess population sustainability of a management program are outlined below.

Alternative species studies. The ecology of dozens of potentially valuable species in Bolivia have received little attention from researchers and the silvicultural treatments that favor their regeneration and growth are apparently not known. In other words, if these species are to be managed in a sustainable fashion, studies will have to start more-or-less from scratch. The goals of these studies will be to document the effects of current harvesting practices on populations of these species, and to understand enough of their ecology to design sustainable management plans. Rather than fund researchers solely from abroad to undertake these studies, the BOLFOR project envisions having experts working closely with Bolivian students working on their senior theses, Bolivian post-graduate students, and employees of the research branch of the Cámara Nacional Forestal and other organizations. The project will provide financial and logistic support but, more importantly, it will provide scientific guidance and training.

One major problem with which the project will necessarily have to deal is that tree species differ in their ecological requirements; the appropriate silvicultural techniques likewise varies among species. Some species are light-demanding and require large canopy openings for successful regeneration (e.g., Swietenia). Other species suffer from excess heat or light in large canopy gaps, especially if the gaps are opened suddenly. The conditions that favor light-demanding trees of commercial species unfortunately also favor light-demanding vines and other weeds.

If regeneration of the commercially important or potentially important tree species depends on fairly radical stand manipulations, the project will have to address the deleterious

effects on shade-loving animals and plants. Where the balance will be found between fostering regeneration of commercially valuable species and keeping environmental effects to a minimum remains to be seen. It should be kept in mind, however, that stand dominance by tree species adapted to major disturbances suggests that disturbance, natural or anthropogenic, has played an important role in stand development.

Ecosystem scale studies. The major component of a population stability analysis is population structure (i.e., size-class frequency distribution) and the growth rates and survivorship probability of trees in each size class. These data emerge from permanent plots subjected to different silvicultural treatments and then monitored over a period of years. Studies on spatial distribution in relation to light levels, or topographic position, along with physiological studies on light, nutrient, and moisture relations serve as strong complements to the longer-term plot based studies. Using data on population structure and the probability that individuals survive and make the transition from one size class to another allows calculation of population stability. Calculation of population stability under different management regimes (either imposed or mathematically simulated) are made using matrix algebra (population projection and sensitivity analyses). Determination of the appropriate silvicultural management technique for 10-12 tree species and possibly as many as 5 of non-timber product producing species will be among the challenges awaiting researchers.

The only way to address these very fundamental issues is by developing an understanding of the forests that currently are being degraded or destroyed. The BOLFOR project does not pretend to already have this understanding but intends to foster its development through sponsoring the requisite training and research.

In addition to helping to develop forest management practices that result in sustained yield of timber, the BOLFOR project will address broader issues of sustainability (e.g., maintenance of species diversity, water quality, wildlife populations, and biogeochemical processes). The priorities for research, however, are not yet clear. For example, soil compaction and stream sedimentation are major problems in many logging areas but do not seem to be particularly acute in Bajo Paragua. The probable role of fire in the area and the effects of logging and silvicultural treatment on fire frequency and intensity, in contrast, are very real concerns that will be addressed once some baseline data are available.

3.2.5 Indirect Impacts of Value-Added and Marketing Activities on Sustainability of Forest Resource Use

The sustainability of the value-added/marketing component is dependent on success in achieving sustainability in forest management. Current practices will lead to the elimination of mahogany as a significant export commodity in Bolivia before the BOLFOR project begins to have an impact on forest management. Other timber and non-timber products could follow in the wake of mahogany for the reasons stated in the caveat on the need for constraints on cutting (Section 1.3).

Value-added and marketing activities will impact the forest resource as a whole through increased demand, either overall or for selected species. Value-added through

processing into finished or semi-finished products may increase efficiency of forest product use. For example, mahogany stumps can be processed into high value burl veneer, short pieces of wood can be carved into chair legs, raw boards converted into precisely finished furniture components, and Babassu nuts converted into oil, activated charcoal and cattle feed. The danger is success. Unless management plans, legal constraints and education are in place, success in adding value to a specific product can result in unsustainable pressure on that resource, wildlife or the ecosystem itself.

Broadening the range of species used has an obvious appeal as the mainstay of the timber industry, mahogany, disappears. More species from a given site offers the opportunity to reduce overall system impacts by concentrating logging activity in smaller areas for the same overall value of products removed. This potentially increases profitability, reduces road construction and in some cases may result in increased regeneration of such species as mahogany. Again, the danger is success in the absence of constraints. Broadening the species base of the forest products industry will occur with or without the project. After carefully assessing the sustainability of the harvest of each candidate species and assessing the system level impacts, the BOLFOR project would explore how species can be utilized in the context of a site-specific sustainable forest management plan. Forest management plans will first be developed in the Moira concession and the Lomerio community forest following research on impacts and sustainability.

One approach to adding value which will not be advocated is the use of species or whole arrays of species for high volume/low value purposes such as biomass fuel, paper pulp, chipboard or plywood core material.

4.0 MITIGATIVE MEASURES

The following mitigative measures will enable USAID/Bolivia and the BOLFOR Project participants to offset, minimize, or avoid any possible adverse environmental effects and to ensure that project activities are carried out in an environmentally sound manner. The measures presented are primarily directed to ensure that forestry and associated project activities are carried out in a manner that, in accord with Section 533(c)(3) of the 1991 Foreign Operations Appropriations Act, maintain the forest's ecological functions and minimize impacts to biological diversity. Note that many of these mitigative measures are based upon the current plans of the BOLFOR project design team and are fully consistent with the project's goals and objectives. While the measures discussed in this section reference the Moira concession, they are widely applicable to other sites in the humid tropical forests of Bolivia.

Mitigative Measures for Currently Specified Project Activities

Prior to the establishment of the BOLFOR Project research plots on the Moira concession, a binding agreement should be reached between the Project, the concessionaire and appropriate public and private authorities (e.g. the MDSMA, the Centro de Desarrollo Forestal) that (a) the research plots will be under the full control of the Project during the life of the project, and (b) the BOLFOR silvicultural research practices will not be

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recommended by the project until project research determines the conditions under which the ecological sustainability of these practices can be assured. This research should include, but not be limited to, an assessment of the (a) the abundance and distribution of commercial trees of intermediate size classes that would be freed from competition, (b) the abundance and distribution of wildlife populations that might be affected by this practice, (c) the identification of keystone species (e.g. non-commercial trees providing important fruit crops during periods of seasonally low fruit abundance) or habitats (e.g. streamside corridors) that should be fully protected, and (d) studies of the effects of liberation thinning and other forestry practices on biological diversity.

The BOLFOR project should investigate the role of natural and anthropogenic fire in the Lomerio and Bajo Paragua forests, and, as appropriate, institute fire control programs at both sites.

Project activities at Lomerio should support the training of community members in sustainable forest and wildlife management.

The BOLFOR project should support research into the subsistence use of wildlife in the Moira concession and Lomerio community to assess (1) the impact of hunting on prey species populations and (2) the effectiveness of different strategies to reduce hunting to ecologically sustainable levels.

BOLFOR project activities involving work with local communities (both at Lomerio and with the seasonal laborers employed by the Moira concession) should make particular efforts to ensure that research is conducted and technical assistance provided in a manner most appropriate for local social conditions. BOLFOR technical staff directly involved with this aspect of the project should therefore receive training in appropriate methods of community participation, particularly Participatory Rural Appraisal.

Surface surveys of archeological artifacts, and information on culturally important sites (e.g., sacred lakes, hills, etc.) are required in any areas where the Project may be involved in construction or other activities disturbing existing habitats.

Monitoring and evaluation of the ecological impacts of project forest management activities should be carried out in the manner specified in section 5.0.

Amendments to this environmental assessment should be carried out in the manner specified in section 6.0.

5.0 GUIDELINES FOR MONITORING AND EVALUATION

Monitoring and evaluation of the ecological impacts of forest management practices is a central component of the BOLFOR project and should be carried out on an ongoing basis and the results continuously integrated into the rolling project design. For example, monitoring the impacts of selective logging on biodiversity will require (1) baseline information on the patterns of wildlife distribution, abundance and diversity with in the

project sites, (2) the establishment of several replicate plots receiving different types or intensities of logging and silvicultural treatment (including a set of no logging control plots), (3) the mapping of appropriate vegetation parameters before and after logging and silvicultural treatment, and (4) the use of various (and well-established) techniques to monitor mammals, birds, forest phenology and terrestrial invertebrates in each replicate plot (e.g. Taber and Rumiz, 1993) and "downstream" effects on freshwater invertebrates where appropriate. The study of freshwater invertebrates is particularly useful as well for measuring the impacts of timber harvesting on water quality. One critical factor influencing the evaluation of these impacts is the size of the replicate plots. The planned ca 0.5 ha plots at the Moira concession, for example, are far too small to meaningfully assess the impacts of timber harvesting on most vertebrates. *This should be addressed either by substantially increasing the size of research plots on the Moira concession (i.e. to ca 50-100 ha) or by conducting these studies at Bosque Chimanes as proposed by Gullison (1993) where plots of appropriate size have already been established.* Gullison's (1993) proposal to develop a standardized and efficient method for monitoring biodiversity by assessing how the accuracy of a given monitoring method varies with sampling intensity may have important implications for, for example, minimizing the cost of eco-certification and should be incorporated into the project research.

Before the BOLFOR Project can establish a well-designed monitoring system to determine impacts of Project activities, studies similar to those being carried out in the Rios Blanco y Negro Wildlife Reserve will be necessary to determine the baseline conditions of biological and non-biological ecosystem components that could be affected directly by Project activities and indirectly by changes in forest management practices suggested by the Project. To rationally plan forest management programs, it is necessary to map the forest types and the distribution of commercially important species in the concession area, and in any other areas where the Project may work. Initial inventories should concentrate on forest communities containing mahogany (mara, *Swietenia macrophylla*), as Project research and demonstration activities will concentrate in these areas. The forestry and environmental/biological data are complementary, and both are necessary for successful implementation of the Project.

It will be the responsibility of the USAID/Bolivia Project Officer for the BOLFOR Project to conduct periodic monitoring to ensure compliance with the mitigative measures. The Project Officer should work in association with the BOLFOR Project Manager to establish a time schedule for completing each of the mitigative measures and to require the Project Manager to document their implementation on a semi-annual basis. Semi-annual documentation of this environmental monitoring should be made available to the USAID/Bolivia Environmental Officer, for his/her approval, and other interested parties who submit formal requests for the information.

6.0 GUIDELINES FOR AMENDMENTS TO THIS ENVIRONMENTAL ASSESSMENT

Areas of concern in supplementary site specific EAs are related primarily to forest management plans for commercial scale extraction of forest products:

- Non-timber forest product extraction
- Forest management and silvicultural demonstrations
- Site-specific commercial forest management assistance

These EAs should serve a dual function; first, they will satisfy the letter and spirit of Section 533 requirements, and second, the EAs will serve as the basis for meeting national and international sustainable management certification requirements.

6.1 Key Issues to be Addressed

Future environmental assessments (technically, amendments to this environmental assessment) should be conducted for any planned project activities that are not explicitly addressed in this EA and that may have significant environmental impacts. This should include, but not be limited to, assessments of the environmental impacts of:

- Project activities that directly or indirectly promote the forestry activities described in Section 3.0 in sites other than the Moira concession or Lomerio community forests or involving silvicultural practices not described in this environmental assessment.

- Project activities that directly or indirectly promote the use of additional timber or non-timber forest products (NTFPs) in the Moira concession, Lomerio community forests or other selected sites. Excluded from these EA's should be applied research conducted to determine ecologically sustainable levels of product harvesting.

- Project activities that directly or indirectly promote ecotourism.

6.2 Recommendations for Supplemental EAs and Environmental Reviews

First phase activities, baseline data gathering, non-site-specific training, and preliminary research (small research plots) will contribute to the development of forest management plans. This project will assist timber concession holders (initially Moira and Lomerio) and other forest users to develop management plans. However, prior to implementation of the site specific management plan, an EA or Environmental Review (ER) must be conducted. In binding agreements with concessionaires and other forest users, it shall be stipulated that an EA or ER must be conducted on a forest management plan (see below) prior to implementation and the findings of the EA or ER, including mitigation measures, shall be incorporated into the management plan. The sequence and process of future EAs and ERs is envisioned as follows:

6.2.1 Initial EA and Guidelines

The initial forest management plan EA (probably for the Moira concession) will be the most labor-intensive. Concurrently with this EA will be developed a set of harvest/environmental Guidelines drawing upon data and experience from the small research

plot activities. These Guidelines will provide the basis for the elaboration of future management plans. The initial EA and Guidelines will be conducted by the Contractor who will form a competent interdisciplinary team drawing upon the Contractor team, Bolivian professionals and outside experts. The findings, conclusions and recommendations of this collaborative effort must be agreed upon by all team members and be approved by the MEO and LAC/DR/E. Potential sources of outside expertise include LAC/DR/E, the R&D Bureau, BSP, the Mission Environmental Officer, the Regional Environmental Advisor for South America, consulting firms and PVOs. Priority should be given to working with experts who can also assess whether project forest management practices will meet ecocertification standards for the international marketing of forest products.

6.2.2 Content and Focus of EAs, ERs and Guidelines

EAs, ERs and Guidelines will address the overall process of forest management including mitigation of impacts on biodiversity and ecosystem processes. Specifically addressed will be the utilization of new species, cumulative impacts of extracting new species, impacts of the construction of temporary and permanent roads and impacts of ecotourism. Guidelines, EAs, and ERs must incorporate the requirements and issues in 22 CFR 216 and Section 533 of the Foreign Assistance Act, as amended. Guidelines should also ensure that forest product harvesting will not be addressed on a piecemeal basis, but that cumulative impacts will be evaluated and the activity considered in an ecosystem context. Guidelines should provide for monitoring and evaluation mechanisms as developed from the small research plot component of BOLFOR.

6.2.3 ERs for Subsequent Forest Management Plans

The approved guidelines will be used to develop subsequent forest management plans. ERs will be required for these plans and will be much less labor-intensive, probably requiring only a discussion of compliance with approved guidelines and applicability of the already existing EA to this specific site. Where approved guidelines and an applicable EA already exist, ERs and guidelines will be drafted by the Project Ecologist. Oversight and approval of the draft will be provided by the MEO, who must approve the ER. When using LAC/DR/E approved guidelines and ER to develop a management plan, the test to determine compliance lies with the USAID/Bolivia MEO.

6.2.4 Triggering of Follow-On EAs, ERs and Guidelines

If the MEO determines that an earlier set of guidelines and/or an EA/ER are not applicable to a new site, a new product/species is involved, or that the cumulative impact of harvesting forest products at the site will be significant, the MEO may require a more extensive evaluation of impacts in a separate EA with accompanying guidelines. Additional EAs/ERs and guidelines will generally require a team of one to three individuals with Bolivian participation. The Project Ecologist will normally participate in this process. The level of effort involved will be determined by the MEO and the resulting documents will be approved by the MEO and LAC/DR/E.

6.3 Assessments on Non-Timber Forest Products

Future environmental assessments that focus on non-timber forest products should follow a common set of general criteria for evaluating whether project activities will have a negative environmental impact. A central objective of the BOLFOR Project is to identify and promote the marketing and sustainable harvesting of NTFP's. The overarching conservation purpose of this objective is to increase the perceived value of standing forest in order to discourage the conversion of forested lands to other uses, such as cattle ranching and agriculture. To do so, it is essential that (a) sustainable harvesting levels be identified, (b) potential negative impacts of NTFP harvesting to biodiversity and the forest ecosystem be identified and minimized in project activities, and (c) project activities be designed to minimize the possibility of NTFP overharvesting by groups outside of the project but encouraged by project success.

We have not explicitly examined the environmental consequences of the NTFP dimensions of this project because specific products, sites and project activities have not be identified as yet and the environmental consequences will undoubtedly be product, site and project activity specific. We can, however, lay out some general criteria that the project and future environmental assessments should follow when judging whether NTFP marketing will produce the desired goals of forest conservation and sustainable use. These should include, but not be limited to, an analysis of the population-level consequences of the recommended harvesting and resource management practices.

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Note: Additional Bolivian referenced materials were utilized in various discussions. Many of these were in draft format, therefore not cited as formal references.

APPENDIX 1
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ANNEX D3
SOCIAL SOUNDNESS

1.0 PREFACE

This social soundness analysis is based on a field visit to Bajo Paragua and Lomerio, extensive discussion with members of the design team, interviews with peasants, Chiquitanos, forest concession managers and workers, the technical staff of Ayuda Para el Campesino Boliviano (APCOB), the leadership of the Central Indigena del Oriente Boliviano (CIDOB) and the Central Intercomunal de las Comunidades de Lomerio (CICOL), and the Director and technical staff of the Instituto Indigenista Boliviano.

This social soundness analysis is also based on two technical reports on Gender Issues and Indigenous Peoples in the Lowlands. The gender Issues technical report was produced by SETAM, a La Paz based NGO with expertise in gender issues in Bolivia. The Indigenous Peoples technical report was produced by Mercedes Nostas, an anthropologist based in Santa Cruz, currently working as consultant with CIDOB, and with considerable experience and field research among the indigenous peoples of the Lowlands. Both reports are comprehensive assessments covering all the lowlands populations on these two special topics and were used by the design team as background information and guidance.

One of the most remarkable, though not unexpected findings of the Gender Issues technical report, is the dearth of information on the subject. As will be seen below, the multicultural nature of the population in the lowlands requires site specific studies, if project actions are to adequately address those issues. Such studies are not feasible until the sites are selected for implementation of project activities. Gender determined access to, and ownership of, resources varies considerably among the 29 indigenous peoples, and the several categories of non-indigenous peoples. It also varies according to national law and customary law depending on whether it is a internal (to the group) or external matter, where only national law is recognized or imposed. Ethnic membership, gender, residence, and social and economic status are all variables that affect access and use to resources in this very diverse population of the lowlands.

The reports on Gender Issues and Indigenous Populations are complementary documents to this social soundness analysis. These reports provided important guidance in the design of the project to all members of the team. They will also provide excellent guidance to the implementors of the project, including a comprehensive list of grass-roots organizations, technical assistance NGOs, projects, and the identification of issues that merit further investigation in any site throughout the lowlands.

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2.0 INTRODUCTION AND SUMMARY

Although over the life of the project its activities will be limited to a few selected sites, most of BOLFOR's expected outputs are intended to have an impact over the use and management of the nation's tropical forests. Because of the intended project outputs and impacts, and the nature of forest use in the country, understanding the regional and national social and institutional context is as important as understanding each site's specific social and institutional context.

Over the past four decades, Bolivia has experienced a gradual and steady shift of its population from rural areas to urban centers and from the highlands to the lowlands. A parallel shift has taken place in the economy from one dominated by mining in the highlands to one in which commercial agriculture and forestry play a growing role. The Bolivian lowlands, which until only a few years ago, were perceived as a vast and sparsely populated region with apparently inexhaustibly resources, are now under siege by what can be characterized as an avalanche of competing claims over its natural resources by forest concessionaires, large scale commercial agricultural and livestock operations, growing numbers of peasant colonists, mining and oil concessions, resurgent indigenous populations, and national and international environmental protection organizations.

Long neglected reform of the laws and institutions of land/natural resources allocation and administration have contributed to creating a situation that will take years to put in order. It is not uncommon to find land which has been customarily owned and used by indigenous peoples for centuries over which there are two land titles granted to different individuals by different government agencies, a forest concession, and a mining concession. All of these "rights" over the land are perfectly legal under a variety of laws that deal separately with land tenure, colonization, forest concessions, mining concessions, and indigenous communal territories. In this kind of legal environment conflict resolution is not so much a question of right or wrong, but of the power to use the system in one's favor. Not surprisingly rural dwellers and indigenous peoples have often lost when confronted by more powerful and better connected rivals over disputed rights to own or use land and forest resources.

In the next five to ten years, these competing claims over the resources of the region will sort themselves out through the national political system. If the current eight year democratic political system persist, the resolution of actual and potential conflicts may be resolved fairly. The focus on the lowland's resources and their uncertain future have contributed to an unprecedented effort by the Bolivian government to modernize and upgrade its legal and institutional capacity to protect the environment, and to deal with the increasing demands on the natural resources of country and the lowlands in particular. Part of the reforms underway include the recognition and protection of indigenous peoples rights to their traditionally held territories and their resources.

The changes in environmental legislation and institutional roles and responsibilities are only beginning to be implemented. They have a long way to go before significant and noticeable changes take place in the actual use and management of the natural resources of the country, and especially the resources of the lowlands region. What is more, additional

and related reforms are needed in the allocation, administration and tenure of land, forest, mining and oil concessions, as well as in local participation and governance and administration of justice, if the goals and objectives of the new environmental legislation are to be accomplished.

Fortunately, those changes seem to be in the making. Although the outcome of the June elections is unclear, there seems to be consensus among the main political parties on the need to move ahead with the comprehensive overhaul of the laws and institutions that govern the country. This includes modifications in the constitution of the country, decentralization of central government functions, and some devolution of power to the regions. There is widespread recognition that many of the problems at the local and regional level are due to a highly centralized system of government and administration, which is no longer effective nor fair, and which needs to be changed if the needs of the country and its citizens are to be met.

In summary, the project will be implemented in a national context that is undergoing a process of transformation. With this social and political context in mind, the project design team has aimed at maximizing the outputs of the project by carefully selecting the institutions it will work with, and the activities it will undertake. Social impacts of the project will take place at the national and site specific levels. One of the main national level impacts of the project will be to provide reliable information to both decision-makers and natural resource users to help them make the right policy and management choices. A second major national level complementary project impact will be on the formation of human resources in a variety of technical subjects and at all levels. Additional project impacts will accrue to large and small concessionaires through better management systems of forests concessions, and to new or additional non-timber enterprises. Project activities will also have significant positive impacts on rural communities and indigenous peoples through a series of programs aimed at valuing their technologies, identifying non-timber forest products with commercial potential, and at incorporating them into a community-based research and monitoring network to assess and document the impacts of human activities on their environments.

3.0 SOCIAL AND CULTURAL FEASIBILITY

3.1 Regional Social and Cultural Context

The Bolivian lowlands, the region where this project will be implemented, occupies two-thirds of the 110 billion hectares as that make up the Bolivian territory and has a population of 1,900,000 people, according to the 1992 census. Over 1,200,000 or nearly 66 percent of this population resides in "urban" areas, which according to the census classification includes all population centers of 2,000 or more inhabitants[1].

The majority of the urban population resides in the city of Santa Cruz, which in 1992 had a population of nearly 700,000 inhabitants or almost 37 percent of the total Lowlands

[1] 1992 Census data taken from: **Censo de Poblacion y Vivienda 1992. Resultados Preliminares.** Republica de Bolivia, Ministerio de Planeamiento y Coordinacion, Instituto Nacional de Estadistica, La Paz, Julio 1992.

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population. The remainding urban population (of over 500,000) is distributed among the departmental capitals of Beni and Pando and 58 towns with population ranging from 2,000 to over 60,000 located in the 34 provinces of the seven departments that make up the lowlands region of Bolivia. The majority (51) of these towns are located in the departments of Santa Cruz and Beni and they were funded as religious missions in the XVI and XVII centuries.

The rural population of some 600,000 individuals is distributed throughout this vast region in small communities and hamlets of subsistence peasants, hacienda workers, rubber and castaña collectors, forest concession workers, highland agricultural settlers, gold mining camps, and semi-nomadic hunting and gathering indigenous groups.

The region is also home to 29 indigenous peoples (pueblos indigenas) varying in number from 14 individuals to over 40,000[2]. The 29 groups are estimated to account for 190,000 inhabitants of the region. Most, but not all, are found in rural communities and hamlets in areas traditionally inhabited by members of the pueblo. A significant number, however, are urban centers residents, primarily in the mission towns of Beni and Santa Cruz established during the XVI and XVII centuries.

Beginning in the early 1980s, the lowland indigenous peoples have organized themselves into a powerful national force to reclaim their rights and to undertake projects to help themselves. At the national level with offices in the city of Santa Cruz, the Confederacion de Indigenas del Oriente (CIDOB) represents regional and local indigenous organizations. Regional organizations represent indigenous groups located within their boundaries. These include: the Central de Pueblos Indigenas del Beni (CPIB), the Central Indigena de la Region Amazonica (CIRABO), the Asamblea del Pueblo Gurani (APG), and the Coordinadora Etnica de Santa Cruz (CESC).

The Paz Zamora administration has, since 1989, moved quickly to recognize the legitimacy of territorial, cultural, and social rights of the indigenous peoples. In quick succession, it ratified the revised ILO Convention on Indigenous and Tribal peoples, decreed territorial rights for the Siriono, Mojeno, Yuracare, Chiman and Chiquitano peoples, drafted a new Indigenous Peoples Law (still under consideration), and formulated a $50 million program (Plan para la Defensa y el Desarrollo Indigena). The Instituto Indigenista Boliviano (IIB) which may be elevated to the rank of Subsecretaria within the Ministry of Agriculture and Peasant Affairs (MACA) is in the process of completing studies to define territorial rights of several indigenous groups, and opening regional offices to serve indigenous groups throughout the region. The IIB is also charged with finding the resources to finance the $50 million Indigenous Peoples Program.

While the Paz Zamora administration's intent and actions are laudable, it appears that the constitutionality of the indigenous territorial decrees has not been fully considered, nor the potential conflicts that it may generate, nor the feasibility of actually implementing them. The final outcome of the government's indigenous territorial decrees is therefore uncertain.

[2] In the Government's terminology Indigenous Peoples are referred to as the Pueblos Indigenas del Oriente, Chaco and Amazonia. In this paper, for brevity, we use Indigenous Peoples of the lowlands.

The territorial decrees add to the already confusing and conflict prone land tenure and natural resource use situation.

The region was until recently, and in parts still is, isolated from the rest of the country. Prohibitive transport costs and the lack of infrastructure have made use of most of its resources highly selective and of low intensity. However, despite the isolation and high transport costs, the region has periodically been subjected to onslaughts by outsiders seeking to exploit highly priced natural products. The best and most dramatic examples are provided by the extraction of quinine in the mid 1800s, followed by the rubber boom of the late 1880s and early 1900s, collection of castaña (brazil nuts) since the 1920s, export of exotic wildlife for pets, and widespread hunting of wildlife for food and for valuable hides from the 1950s to the 1970s. Since the 1970s, extraction of wood, gold mining, coca cultivation, a rapidly advancing agricultural frontier of highland peasant colonists along the Andean foothills, and large commercial farmers around the city of Santa Cruz have became the main threats to the sustainability of the fragile environment of the region. Because of their magnitude, these threats are far more serious to the environment than past booms in selected resources.

Each one of these activities has had significant impacts on the resources and the people of the region. While the environmental impacts have usually been local, the social impacts have been region wide. Considerable migration by indigenous and other rural residents in search of work characterizes each of these temporary bursts of commercial activity. In fact, rural labor migration is widespread in almost all rural areas distant from urban centers. There is also considerable rural to urban migration, with some provinces losing population steadily over the past 20 to 30 years.

Timber extraction, rubber tapping and castaña collection, extensive livestock raising, and small and large commercial agriculture are the dominant activities in the region today. Most rural inhabitants are affected by these activities to some degree. In fact in most rural areas, employment in these activities is the only source of cash and it supplements subsistence farming or hunting and gathering.

The lowlands have long been perceived as a sort of "promised land" or El Dorado by a growing number of Bolivians. Acting on this perception has led growing numbers of people to seek some means of establishing a stake in its resources. Most of these claims (stakes) over lowlands resources are paper claims over land, forest, and suspected mining deposits. They tend to be more speculative than real. Nevertheless, the outcome of this rush to claim a stake on some lowland resource has meant, at least on paper, the end of the frontier. It is not an exaggeration to assert that every hectare of land has some form of claim over it. The urgency to establish real boundaries around privately held land, protected areas, and indigenous territories is in part due to the fact that the lowlands are no longer perceived as an "empty" frontier. There is also growing recognition that the environment of the lowlands is fragile, and that if it is to provide long-term wealth to its stake-holder, it must be managed with care.

It is in this regional and national context that the feasibility of the BOLFOR project must be assessed. BOLFOR project outputs respond to a growing regional, national and

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international demand for the sustainable use and management of the natural resources of the lowlands. The information it will generate and the human resources it will help form are crucial to answering the needs of decision-makers, users, and protectors of natural resources.

3.2 Site Specific Social Context and Feasibility

The MOIRA forest concession in Baja Paragua and the Chiquitano Lomerio Forestry Project are examples of two likely locations for initial BOLFOR activities. The sites and the enterprises that operate them are highly representative of the two extremes of the social and economic spectrum of individuals (and groups) with high stakes in the forest resources of the region. The Moira concession represents the industrial forestry industry, while the Lomerio Forest project represents what may be called the social forestry sector.

3.2.1 Moira Forest Concession

The general area where the Moira concession and the neighboring Noel Kempff Mercado National Park are located was last inhabited by the remnants of the Guarsug'we Pauserna nation. It is now believed that this lowland indigenous group is extinct. J. Riester's ethnography on the Guarasug'we Pauserna written in the 1970s is sadly the only and last record of this indigenous peoples of the lowlands. Dr. Riester, who now directs APCOB, an NGO dedicated to support indigenous peoples, believes that isolated individuals may still be found in Florida and some of the other communities in the region.

The Moira Forest Concession in Bajo Paragua is owned and operated by Santa Cruz based entrepreneurs. They are representative of the largest and more "efficient" forest concessionaires. Apart from its labor force, which is largely imported from urban centers, and the community of Florida (with 34 families), there are no other inhabitants inside the concession. The Canton Bajo Paragua where the Moira concession is located, however, has 231 families (1,218 individuals) distributed in 8 communities: Piso Firme, Comunidad Cachuela, Mancomunidad Porvenir, Comunidad Bella Vista, Comunidad Santa Teresita, Comunidad 10 de Abril (reportedly abandoned), Comunidad Florida, and Comunidad Puerto Rico.[3]

All of these communities were originally established by siringueros (rubber tappers) early this century. Throughout the years they have been abandoned and re-settled following the ups and downs of the rubber industry, forest concessions, Asai Palmito (palm hearts) processing plants, and (in the 1980s) the export of exotic wildlife (e.g., parrots and monkeys). It is unlikely that they would be inhabited today, where it not for the Moira and other forest concessions in the region and the palm heart processing plants.

Florida, the community inside the Moira concession, is a community established by siringueros earlier this century. It seems to retain its present population of 34 families

[3] Proyecto de Proteccion de los Recursos Naturales en el Departamento de Santa Cruz. **Estudio de Delimitacion de Areas Especiales de Comunidades Indigenas. Delimitacion y Uso del Suelo Pueblo Chiquitano. Resumen.** Alejo Zazycki Orlow. Santa Cruz, Febrero de 1993.

primarily thanks to the economic activities generated by the concession and its mostly imported labor force. Most families in this community cultivate small plots (chacos), provide wild game to the Moira work force, and work intermittently in the concession under contract as laborers or tree finders. The community supports a new coffee growers' cooperative under a CORDECRUZ sponsored rural development program. Chacos are abandoned after two years because of the extremely poor soils. In fact, the area has never supported any sizeable agricultural community. Farming is strictly a subsistence and supplementary activity to other sources of income.

The social and cultural profile of the concession and its workers is that of an enclave temporarily established to "exploit" a resource. The reason for this type of behavior will probably be amply justified by economists citing among other factors the following: tenure insecurity, market-driven highly selective logging practices, high costs of production and transport, alternative uses of capital, and high risk investments.

While economic reasons may very well determine the conduct of large forest concessions, the "culture" of forest enterprises like Moira is strikingly distinctive and can be characterized as a "mining" operation. The description that follows is based on a visit to the Moira concession and on interviews with people knowledgeable of the industry. It is intended as a composite profile of the "typical" forest concession operation.

The majority of the workers (almost always male) are hired in urban centers for the season, which, depending on the area the concession is located in, may last from six to ten months (Moira's operating season is ten months long). Female workers may be hired as office workers, cooks and house keepers of the camps. However, because of the predominance of male workers living alone, concessionaires prefer not to hire women. Highly skilled workers (in short supply) may be paid year round salaries to keep them. Most workers move to the concession alone and live in highly regimented camp type accommodations. They work from eight to ten hours a day, and are given home leave intermittently throughout the work season (Moira works two ten-hour shifts six days a week during its high season of March to December). Some workers bring their families, especially those who have small children not yet in school. The bigger and richer forest concessionaires provide medical attention (Moira employs a doctor) as well as other benefits, such as food and sleeping quarters and subsidized transport between homes and the camp.

As a rule forest concessionaires do not employ local residents, if there are any nearby, except as day workers or for short periods of time. They are considered unreliable and not used to the discipline of eight to ten hour work days. Since employment is seasonal, rural residents who depend on agriculture and hunting for their subsistence year round are unwilling to work for long periods in the concession if it means abandoning their subsistence agriculture. In the case of Moira, although only a few of the residents of Florida (the community inside the concession) work in the concession, most families benefit from the concession by providing goods and services to the work force, including wild game. Florida families interviewed indicated that while the head of the household did not want to work in the concession, the younger adult sons did and they expected to do so permanently,

especially if they were able to acquire a skill. The prospect of skilled employment of their male sons was cited as one good reason for the family staying in Florida.

Forest concessionaires also hire independent contractors to find and mark trees to be cut. These contractors are known by the revealing term of casadores de arboles (tree hunters). Since they are independent contractors, they are expected to take care of themselves and do not receive food or other benefits provided to workers. The independent contractors operate as family-run businesses. The wives set up camp in the area where they are working, and take care of food preparation and their small children. Male sons not in school and too young to work by themselves work with their fathers. Some of them set up house in Florida, where there is a rural school, and which they use as a base of operations.

Even though a forest concession may be ten years old and have substantial investments in it, it is still treated as a temporary enclave. There appears to be nothing but the "exploitation" of the forest to keep the workers there. Moira is unique in that one of the partners of the concession lives in the concession during the high season. His permanence there, however, is only temporary, as is that of his workers. Lack of permanent tenure over the forest seems less important as a reason than the mining nature of the industry. The forests are treated as a non-renewable resource.

Concessions with rural communities near their camps, as Florida is to the Moira camp, provide a semblance of permanence and a more "normal" life. In fact, however, if the community does not precede the forest concession camp, and offer alternative sources of income, it is as ephemeral as the concession is after logging its most valuable wood.

3.2.2 The Chiquitano Lomerio Forestry Project

The Chiquitanos, numbering more than 40,000, are one of the largest Indigenous Nations (Pueblo Indigena) in the Lowlands. They are settled in some 320 communities in the Provinces of Nuflo de Chavez, Velasco, Angel Sandoval, Chiquitos, German Bush, and part of Cordillera. This region is referred to as the Gran Chiquitania. Despite several centuries of contact with Spanish-speaking Bolivians and the State they maintain their language, identify themselves and are identified by others as Chiquitanos. The Chiquitano Nation was nearly devastated (as were many other indigenous peoples of the lowlands) during the rubber boom of the late 1910s and early 1920s. Thousands of Chiquitanos were forcefully drafted and taken to work as siringueros (rubber tappers) in areas north of their territory. The emergence of ethnicity as a political, social, and economic force is having a noticeable impact in the area, as old patterns of relationships between indigenous and non-indigenous Chiquitanos are being re-defined.

The Lomerio Forestry project is located in the canton Santa Rosa del Palmar of the province Nuflo de Chavez in the Santa Cruz Department. The population of the canton consists of some 790 families (including Chiquitanos and non-Chiquitanos) distributed in 35 communities.

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One of five[4] forestry projects owned and operated by indigenous peoples, the Chiquitano Lomerio Forestry Project offers not only a dramatic contrast to the Moria concession, but also illustrates how the social, economic, and political context affects indigenous peoples efforts to undertake forestry projects.

The project is managed by the Central Intercomunal Campesina del Oriente Boliviano (CICOL). The project begun in 1983 with 23 of the 35 communities in the Canton Santa Rosa del Palmar, and with the support of Santa Cruz based NGO Ayuda Para El Campesino Oriental Boliviano (APCOB). CICOL has expanded its work to all 35 communities in the canton. In addition to CICOL, which is the most important organization, the corregidor (the local political authority), the director of the rural school, and the church play leadership roles. The Lomerio Project, as it is known in the area, includes in addition to the forestry project the following components: institutional and organizational strengthening, territorial consolidation, and agricultural production subprojects. With APCOB assistance, CICOL has integrated women into its organizational structure and it is also supporting a women's project.

CICOL's eight year effort to consolidate its territory, and to obtain a 130,000 hectares (of which only 40,000 are appropriate for production) forest concession are actively opposed by non-indigenous persons (local and external) with competing and overlapping claims to the area's resources (forest and mining concessions primarily, and an unclear land tenure situation). Despite the fact that CICOL's forestry project began in 1986, and that their forest is being managed sustainable manner, CICOL has been unable to legally consolidate its claim to the 130,000 Has. forest concession.

Conflict over the forestry and mining concessions, and more importantly conflict over land tenure and indigenous territorial rights, presents CICOL with formidable challenges. The fight over territorial rights (including forest use) has forced CICOL to spend an inordinate amount of time and resources in organizational efforts, and internal and external conflict resolution. Although CICOL was able to obtain a presidential decree partially recognizing their territorial claims, the outcome of its fight to obtain full territorial rights remains unclear. Until the laws governing land tenure, forest and mining concessions are modified or changed, the Indigenous Peoples Law passed by Congress, and the new environmental laws implemented, the outcome of CICOL's claims will depend on the political force it can muster. In the past, CICOL's chances would have been near nil; today, given the changes under way and the increasing support for indigenous people's rights, CICOL's chances for success are good, but not certain.

CICOL's leadership realize that their strength as an organization, and their ability to successfully run their forestry project, is not only essential for their survival locally, but also

[4] The other four are the (1) Ayoreo-Zapoco Communal sawmill (closed since 1989 and expected to start operation again in 1993), (2) the Programa Forestal Izozog, (3) the Natural Resource Management Project of San Javier Guarayo, and (4) the Proyecto de Forestacion Social del Central Indigena de Concepcion. All are assisted by APCOB. Another project with TA from ITTO, which involvs indigenous peoples, is the (5) Chiman project in Beni.

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can influence changes in the national context. The failure of their forestry project[5], they argue, could re-ignite internal conflict and provide ammunition to outsiders with claims over the resources of their territory. Given the stakes involved in their forestry project, CICOL welcomes the kind of technical assistance BOLFOR can provide.

CICOL's forestry project provides BOLFOR with an ideal client. CICOL is a highly motivated grass roots organization. It is well organized and competently run. CICOL has financed the education of three technicians to operate the sawmill, and manage its forests. CICOL members and the APCOB forestry engineer have taken natural forest management courses in CATIE Costa Rica. CICOL also receives Dutch technical assistance. CICOL is implementing a wide ranging program to deal with the needs of its member with assistance from a capable NGO, APCOB. The situation permits a project like BOLFOR to provide highly focussed and effective technical assistance, which is what both CICOL and APCOB cannot afford and most need.

One of the greatest risks CICOL's forestry project faces is that it has been elevated it to the center piece of CICOL's multifaceted program. There is a possibility that to meet unrealistic expectations CICOL may feel it necessary to use the forestry project's financial resources to finance social projects. Understandable as it may be, for an organization like CICOL, to use its forest enterprise resources to subsidize other projects or to expand the number of its employees beyond what is needed to run the business, any technical assistance to their forestry project must emphasize the importance of running the forestry enterprise as a profit making business. It must also emphasize its separation from other activities. In fact, it would be ideal if CICOL's participation in the business is reduced to that of a board of director's role, and either hire skilled outsiders or train more local members to run it as a business. Fortunately both CICOL and APCOB seem to be moving in this direction. BOLFOR should reinforce this decision early on, perhaps by making it a precondition for CICOL's participation in the project.

4.0. PROJECT IMPACTS, BENEFICIARIES, AND BENEFITS

There are many anticipated benefits and beneficiaries if the project is successfully implemented. Project beneficiaries can be classified into five types: GOB and NGO institutions, timber and non-timber forest product firms, community based forest enterprises, individuals, and the indigenous peoples of the lowlands. Many of the benefits will be intangible and hard to measure. Other benefits and beneficiaries are more fully described in the technical annexes.

GOB institutions

The Bolivian Government, through its environmental and forestry agencies, is building its capacity to formulate sustainable natural resource use policies. Initially GOB agencies included are: the Secretaria del Medio Ambiente (SENMA), the Fondo Nacional del Medio Ambiente (FONAMA), the Centro de Desarrollo Forestal

[5] See the Natural Forest Management and EA annex for a description of the Lomerio Forest Project.

(CDF), the Ministry of Agriculture and Campesino Affairs (MACA), and the Santa Cruz CDF. Departmental level Secretarias Departamentales del Medio Ambiente (SEDEMAS) and possible Fondos Departamentales del Medio Ambiente (FODAMAS), to be created independently of the project during its life, will also benefit from technical assistance provided by the project.

Private sector Timber and Non-timber Firms and Community Based Forest Enterprises

The Forestry Industry will benefit in the measure that it adopts project recommendations generated through BOLFOR's research program and the elaboration of sustainable forestry management plans, which will not only increase their profits, but more importantly, will help keep them in business indefinitely. If the forestry management plans and techniques increase profits in the short and long-term as they are supposed to do, the forest industry will adopt them. Additional incentives for forest industry adoption of BOLFOR's recommendation will be provided by international demand for timber from sustainable managed forests.

Non-timber Forest Products firms will also benefit from the project's research into its sustainable production and identification of markets.

Community-Based Forest Enterprises, such as CICOL or others assisted by APCOB or other NGOs, that the project may identify during its implementation.

NGOs

The Centro Para la Investigacion de Recursos Renovables (CIMAR), the Museum of Natural History Noel Kempff Mercado, and the Forestry and Biology faculties of the Gabriel Rene Moreno University of the city of Santa Cruz will benefit by participating in the project's research and training components. The Technical Forestry School of Riberalta, and the National Herbarium in La Paz will similarly benefit by participating in the project's research and training program.

Fundacion Amigos de la Naturaleza (FAN) and Ayuda Para el Campesino del Oriente Boliviano (APCOB), two NGOs based in Santa Cruz will benefit from the technical assistance provided by the project by strengthening their capacities to carry out their mandates.

Individuals

The lowlands population directly, and the rest of the nation's population indirectly, will benefit through the reduction of degradation of forest, soil, and water resources in the lowlands.

Forestry workers, students, technicians, professionals, and decision-makers will benefit through a comprehensive training program specifically tailored to their needs for increased capacities in sustainable forest management. For details, see the research and training component.

The owners and workers of the Moira Concession in Bajo Paragua and the CICOL Lomerio Project, as well as the inhabitants of the areas where these operations are located will benefit, should these two potential clients be chosen as the initial clients of the project. They will benefit with the design and implementation of sustainable forestry management plans and with continuing technical assistance over the period of time the project works with them, which is expected to translate into increased and more secure income over the long run.

Indigenous Peoples

The project will sponsor a program to work with selected indigenous peoples in the systematic retrieval of their technologies and knowledge of the forest and its products. The aim of this program is to identify forest products used by indigenous peoples to augment the environmental research, monitoring, and evaluation of project impacts and of other human activities in selected sites. This program will also seek to identify products with mid- to long-term commercial potential. Benefits from this program include the valorization of Indigenous peoples technologies and, potentially, income derived from the commercialization of forests products identified through their use.

A related program will assess the value (economic and nutritional) of forest products to indigenous populations and rural dwellers in areas of interest to the project. Both programs will seek to spread benefit to all indigenous peoples by working in collaboration with their organizations.

5.0 PARTICIPATORY DESIGN

The project has been designed through a highly successful participatory approach. The GOB Project Working Group (FONAMA, SENMA, and MACA) has participated in all phases of the design effort, and significantly contributed to it. The organizations and agencies that are expected to be directly involved in the implementation of the project include the MDSMA, FAN, APCOB, the Camara Nacional Forestal, the Museum of Natural History Noel Kempff Mercado, and the Forestry Faculty of the Gabriel Rene Moreno University (all were consulted during the design effort). In addition, the Moira Concession and the CICOL Lomerio Forestry Project are expected to provide the pilot sites for project activities, pending satisfactory agreements between BOLFOR and these entities. Other organizations which may be involved in the project in various ways have also been consulted and informed about the project's aims and its design. Among the most relevant are the Development Corporation of Santa Cruz (CORDECRUZ), the Central Indigena del Oriente (CIDOB), the Instituto Indigenista de Bolivia (IIB), the Camaras Forestales of La Paz and Santa Cruz, the Fundacion Bolivia Exporta, CARANA, other government agencies, producers of non-timber

products, environmental NGOs, and numerous others listed in the various annexes of the project.

The same participatory and collaborative approach will be used during the implementation of the Project. The working relationships with selected counterparts, however, will be more clearly spelled out in letters of understanding (or convenios). It is important to note that the project is likely to work with the CICOL Lomerio Forestry Project primarily through providing technical assistance to APCOB, which in turn is providing assistance to the 35 Chiquitano communities that make up CICOL. This modality - working through an NGO with permanent presence in the region, in the context of an on-going forestry project - will allow BOLFOR to maximize its impact with little additional cost. Furthermore, in the case of APCOB, which is working with four other community owned and operated forestry projects, benefits from the lessons learned in the Lomerio project will also be obtained. APCOB's participation multiplies the impact of BOLFOR's technical assistance well beyond its contribution to the Lomerio project. Without APCOB, or a similar NGO, the impact of BOLFOR would be minimal at this level of forest users and the cost considerably higher. During implementation and when BOLFOR is ready to expand its reach, NGO participation should be the preferred strategy when working with communal forestry projects.

6.0 SOCIAL AND CULTURAL PROJECT IMPLEMENTATION ISSUES

Undoubtedly the social and political change Bolivia is undergoing will affect the project's implementation. These changes include a long list of new legislation and/or implementation of newly enacted laws concerning the environment, land tenure, forestry and decentralization of the central government. All of these and other changes in the social and political system of Bolivia amount to a veritable transformation of the social, political and administrative context in which BOLFOR will operate. If carried out as planned and if the eight year-old democratic political system persists, its impact on project implementation will be positive. Realistically, there is little the BOLFOR project can do to influence the outcome of these changes, except provide reliable information to policy makers and forest users. This will be done through the various project components.

Of all the prospective changes in legislation, a new land tenure law and the decentralization of the central government are the most critical, not only to the project's ultimate success, but more importantly to the long-term sustainability of the use and management of natural resources in Bolivia. Without both, the impact of BOLFOR project will be limited. This is not to say that BOLFOR outputs will not have the anticipated impacts, but simply to recognize the importance of the social and political environment.

In a less philosophical vein and more obvious manner, BOLFOR needs to maintain its collaborative approach during its implementation. It also needs to seek an effective approach to reconciling the public and private sector's interests in the forests and the environment. It is in the long-term interest of both to use the forest resources of the country in a sustainable manner. Both sectors should play complementary and supporting roles in the management of the forests, rather than look at each other as enemies or parasites. BOLFOR implementors

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should look at USAID/Bolivia's experience with the seed industry for lessons on how to make the private and public sectors work together.

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ANNEX D4
POLICY CONTEXT ANALYSIS

1.0 INTRODUCTION

The purpose of this analysis is to summarize the positive and negative aspects of current and anticipated laws, regulations and policies governing the forestry and environment sectors in Bolivia, and based on this analysis, to recommend a program of activities for project implementation. Specific tasks assigned to the analysis are contained in the attached scope of work. The current and proposed laws and regulations selected for review include: the 1974 Forestry Law, the regulations of the Historical Ecological Pause of 1990, the 1992 General Environment Law, and the 1992 Forestry Law Project.

Section 2 below presents a brief summary of each law or regulation along with a discussion of their respective strengths and weaknesses. Section 3 outlines the importance of the broader context within which forest sector policies are proposed and implemented, including factors related to the institutional, economic, and ecological setting. Finally, Section 4 presents a recommended program of activities for the policy component of the project. The proposed budget and schedule of activities for the policy component are presented in the attachment.

2.0 FOREST AND ENVIRONMENT SECTOR LAWS AND REGULATIONS

2.1 Ley General Forestal de la Nación (1974)

The General Forestry Law is the primary law governing forest development and protection in Bolivia. It is administered by the Centro de Desarrollo Forestal (CDF), a branch of the Ministry of Agriculture and Peasant Affairs (MACA). Enacted in 1974, the Law gave broad powers and responsibilities to the CDF, including delegation of cutting rights on private and public lands; regulation and promotion of logging, milling and other forest-based industries; collection of taxes from forest production; administration of national parks and reserves; management and protection of watersheds; and, forest-related research.

Though comprehensive, the content and implementation of the Law have been a continuing source of controversy. A number of the more significant areas of concern are discussed below.

Allocation of cutting rights. The mechanism by which cutting rights are granted is subject to abuse and is biased against community and indigenous groups and small logging firms. Although the criteria that determine who may apply for cutting rights are provided in the regulations for the 1974 Law, there is no mechanism to determine how rights should be allocated among competing applicants. Fewer than 80 firms control nearly all of the 22

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million hectares currently under contract, while almost no concessions have been given to community or indigenous groups.

Tenure security. Although the Forestry Law allows for concession lengths of up to 20 years, few long-term concessions have been granted to date. Most are annual or three-year contracts with automatic renewal. Critics of the current system argue that short-term contracts discourage efficient and sustainable management and that longer contracts are therefore preferable. It is not clear, however, that longer concessions will result in better management. Current management is characterized by waves of rapid and selective cutting of a small number of valuable species. Once these species are gone, harvesting moves on to other areas. Since this is the most profitable method of logging, it is unlikely to change with increased tenure security.

Management plans and harvest controls. The Forestry Law provides that the quantity and timing of harvests be controlled by management plans written for each concession. Minimum cutting diameters are used as an additional means of controlling the rate of harvest. Neither, however, has proven to be very effective. Inventories needed to establish annual harvest quantities are conducted by concessionaires who have an incentive to inflate estimates of available timber. In addition, recent studies indicate that the minimum cutting diameters used for mahogany have little impact on the quantity of mahogany harvested because most mature mahogany are larger than the minimum diameter. Finally, neither the quantity or diameter controls are strictly enforced.

Timber pricing. Timber is sold to concessionaires at rates established by a series of taxes levied on the volume of logs removed from the forest. Available data suggest that current rates are set far below the actual value of the timber. This encourages overharvesting and deprives the government of revenue needed for long-term management. At present, revenues are reported to be barely sufficient to fund the collection of additional taxes. Volume-based charges also encourage highgrading, or harvesting only the largest and most valuable trees, and do little to discourage the practice of accumulating huge areas in a single concession in the expectation that eventually the government will allow the land to be used for other purposes.

2.2 Reglamentación de la Pausa Ecológica Histórica (1990)

The Pausa Ecológica Histórica is an interim measure designed to address threats posed to the integrity of the country's natural resources by prevailing exploitation. To allow time for a more effective policy framework to be developed, it places a five-year moratorium on the granting of additional timber concessions. It is an extremely important and encouraging document but is likely to encounter some of the same problems of enforcement that have hampered previous reforms. A number of the policies established in the regulations to the Act are listed below.

Concession length. No additional short-term timber contracts will be offered. Only long-term (20-year) concessions will be allowed and those with 1-, 3-, or 10-year contracts can apply for new concessions with 20-year terms.

Timber taxes. Regional development corporations are required to invest revenues derived from logging in forest management and protection projects.

Management plans. Detailed guidelines are provided for the development of timber management plans. CDF is directed to establish technical departments to oversee inventories and the implementation of management plans. The evaluation and implementation of plans is to be shared jointly by MACA and SENMA.

Wood exports. Beginning in 1995, sawn wood exports will only be allowed from managed forests that are certified by the MDS and CDF.

Community forests. Community groups are to be given priority access to cutting rights in approved areas outside of permanent production forests.

Nontimber products. Certain forests will be established that are dedicated solely to the production of rubber and Brazil nuts. Harvesting of palm hearts without adequate reforestation is prohibited.

SNAP. CDF and the MDS are directed to establish a national system of protected areas (Sistema Nacional de Areas Protegidas, or SNAP).

Concession ownership. Logging companies are prohibited from having more than one concession.

Protection of flora and fauna. Concession holders are declared responsible for the protection of flora and fauna within their cutting areas, are required to discourage hunting and to provide meat from livestock for their workers.

3.0 INSTITUTIONAL, ECONOMIC AND ECOLOGICAL SETTING

The policy context for the BOLFOR Project involves more than just the legal framework within which the forestry sector operates. Equally important, or perhaps more so, are factors related to the institutional, economic, and ecological setting within which policies are implemented.

In Bolivia, as in many countries, there is a large gap between the stated objectives of laws and what can actually be accomplished on the ground. As noted, the institutional capacity of the Centro de Desarrollo Forestal and other government agencies responsible for forest management and protection in the country is extremely weak. As a result, enforcement of existing regulations is difficult at best. However, the new Gonzalo Sanchez de Lozada government's decision to create a new "super-Ministry" for Sustainable Development and the Environment is encouraging, and seems to suggest an increasing emphasis on environmental protection. In addition, little or no economic or ecological information currently exists that could be used to guide in the development and implementation of rational government policies. The intersection of what may be

ecologically or silviculturally desirable and what is financially and economically feasibly is largely unknown.

What is known, is that sustainable management - at current levels of knowledge, and technology - is less profitable than the timber mining currently practiced in Bolivia. Since the growth in value of standing timber is less than the opportunity costs of capital (20 percent or more in Bolivia), from a purely financial standpoint, it is better to harvest trees as quickly as possible and invest the proceeds in something with a higher rate of return than to forgo harvests today simply to ensure that trees are available for harvests in the future. As a result, sustainable management is not likely to be adopted voluntarily. In the absence of government policies that directly constrain the rate of harvest, or foreign and domestic markets that are closed to all but sustainably harvested timber, the goal of sustainable management will be difficult to achieve. Promoting certification efforts as well as sound management policies and the capacity to enforce them should therefore be high priorities for the BOLFOR Project.

To be sure, some silvicultural practices will be worth adopting even from a narrow financial perspective. At present, however, the costs and benefits of these practices are not known. The BOLFOR Project could facilitate adoption of such practices by demonstrating the techniques involved and making information on their financial returns available to the private sector.

Also unknown, are some of the most basic elements of what constitutes sustainable management. To establish the length of cutting cycles, for example, information is needed on growth rates, mortality and regeneration. Yet, even for mahogany (the most important timber species in the neotropics), data on these variables is all but nonexistent, to say nothing of other species with commercial potential. Likewise, very little is known about the impacts of various logging practices on biodiversity.

In sum, there is an urgent need for basic information on a host of issues facing forest sector management in Bolivia. Policy reform is needed. But more important is the need for biological, economic, and silvicultural information upon which these reforms can be based. At present, the policy debate in Bolivia is based far more on slogans, rhetoric, and personal bias than on concrete information. The following section outlines a number of areas in which the BOLFOR Project could help inform the current policy debate for the forest sector in Bolivia and other countries in Latin America.

4.0 RECOMMENDED PROGRAM OF ACTIVITIES

The studies listed below are divided into three categories: (1) issues that relate more or less directly to other project activities, (2) basic studies needed for the development of laws and regulations for forest management, and (3) studies that address broader issues in the forest and agricultural sectors.

The list of studies is not intended to be comprehensive. Nevertheless, the issues encompassed are indicative of the types of questions that need to be addressed in the context of the current debate over natural forest management in Bolivia.

Although each study area involves a discrete set of issues, many can be dealt with using the same data. For example, given the relevant biological information, a number of the questions outlined below can be answered through a basic study of the costs and returns from logging in different areas. Moreover, much of the information needed to address these questions will either be generated through activities already planned for other project components or could be generated in conjunction with planned activities at little additional cost.

The results and findings of studies conducted in the policy component will be directly relevant to the work of public and private sector institutions involved in forest management in Bolivia. Many of the studies will require the cooperation of project counterparts in CDF and the MDSMA, private concessionaires, and representatives of the timber industry. Given the need for cooperation and to help promote a broader understanding and acceptance of project recommendations, every effort will be made encourage active public and private sector participation in policy component activities.

To maximize the impact of the information contained in these studies, it is recommended that they be made widely available in Bolivia and abroad in formats tailored to the intended audience.

4.1 Project Related Studies

Costs and returns of private sector management activities. This study will help prioritize project investments in promoting different private sector management activities by identifying those with the highest marginal returns. It is intended to inform rather than constrain the selection of activities to promote. The project may choose not to promote some activities with high returns for environmental or other reasons. Examples of activities or management decisions to be analyzed include changes in rotation length, mix of species harvested, silvicultural treatments, road design and placement, enrichment planting, and investments in natural regeneration. The study will also examine the costs and benefits of forest inventories and the costs of preparing and implementing management plans.

Costs and returns of government management investments. The purpose of this study is to help prioritize government investments in management and enforcement. Investments examined will include environmental mitigation, harvest tracking, transportation planning (e.g., roads, bridges, culverts, access control, etc.), management plan monitoring and evaluation, research, training, and tax collection. The study will estimate the annual costs of management activities, what they entail in terms of personnel, equipment and training, and how far current management deviates from what is needed. The initial focus will be on forest management in a single department (e.g., Santa Cruz, Beni, or La Paz). Assessment of management needs and capabilities in other departments will follow.

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Opportunity costs of sustainable management. This study will quantify the costs and benefits of altering management activities to comply with forest certification standards based on existing certification criteria as well as information developed during the course of the project. Emphasis will be placed on necessary investments in environmental mitigation and in the timing, location, and species composition of harvests.

Monitoring and evaluation of project investments. This study will quantify the relative returns from investments in different project activities and assist in project compliance with monitoring and evaluation requirements.

The value of hunted game. Much of the value of natural forests goes unrecorded because products gathered in the wild for domestic use are not exchanged in formal markets. This study will help to fill the gap of recognized values by using shadow prices to quantify the importance of forest animals hunted for food. The study will also highlight the impact of logging and other activities on wildlife, the cost of mitigating these impacts, and ways in which wildlife protection and forest management can be better integrated.

Viability of value-added processing. This study will assess the financial viability and national and regional comparative advantage of selected investments in value-added wood processing.

Viability of community forestry. This study will assess the relative returns from different forms of nonindustrial natural forest management. The scope of the study will be tailored to the needs of the project. Its purpose is to identify opportunities and pitfalls of various investments in community forest management. Topics considered will include the appropriate scale of investment, product diversification, risk management, alternative marketing arrangements, sources and needs for technical assistance, and small-holder certification.

Model management plans. The purpose of this activity is to develop model forest management plans for three locations in the Bolivian lowlands: Bajo Paraguá, Alto Madidi/Inturralde, and Bosque Chimanes. The plans will be prepared using GIS-based, vegetation classification techniques to be developed in Bosque Chimanes along with biological and economic information gathered at all three sites during the early years of the project. Though site-specific, the plans will be designed to serve as management tools that, with modification, will be generally applicable to forests in the neotropics. The theory, development and use of the plans will be a major focus of workshops and training activities throughout the project.

4.2 Forest Policy Studies

Logging profitability. The purpose of this study is to determine the extent to which royalties can be raised in different regions and for different species without jeopardizing the financial viability of logging. The study will attempt to reconcile the varied and sometimes conflicting accounts of the private returns from logging reported by different investigators (e.g., the draft reports of Panzer et al., Stewart et al., and the forthcoming studies of Rice et

al. in Bosque Chimanes). Emphasis will be placed on building a defensible database of costs and returns that encompasses the large variability in production costs and resource values that exists in the Bolivian lowlands.

Timber pricing systems. The timber pricing system currently used in Bolivia has a number of serious shortcomings. This study will evaluate the pros and cons of various alternatives to the current system being considered for the new forestry law.

Concession tenure security. The purpose of this study is to evaluate the merits of longer vs. shorter tenure arrangements in the context of natural forest management.

4.3 Forest and Agricultural Sector Studies

After mahogany: the future of forestry in Bolivia. At current rates of harvest, commercial stands of mahogany may be gone in Bolivia within the next ten to twenty years. Without mahogany, the number of active concessions is expected to fall dramatically * from roughly 250 today to as few as 30. This study will explore the economic, social, and environmental implications of increasing concentration in the forest sector of Bolivia.

Tenure arrangements and investments in the agricultural frontier. Although the focus of this project is lowland tropical forests, their future will be affected greatly by government policies directed at the agricultural frontier. This study will draw on activities of the World Bank and other institutions in Bolivia and the experience of neighboring countries in Latin America to provide information and recommendations concerning the interaction between forest protection and agricultural development. The study will examine tenure security for smallholder farmers, government investments in capital vs. labor intensive agriculture, and other issues affecting rates of colonization and deforestation.

4.4 Other Policy Component Activities

In addition to the studies outlined above, the BOLFOR Project policy component will provide ongoing assessments of the capabilities of Bolivian institutions charged with forest management and protection as well as advice on institutional reform and restructuring. The policy component will also serve as a clearing house for information on policy initiatives in other countries, including developments affecting international trade in products from tropical forests (e.g, sanctions, bans, and certification efforts), and will actively seek to provide groups involved in forest protection and development in Bolivia and abroad with timely information on project activities. Finally, every effort will be made to leverage funding for appropriate activities from other sources into the project by informing interested parties of opportunities for joint research and collaboration.

Attachment 1

COMMODITY LIST

OFFICE/CATEGORY	Commodity	Qty
1.1 La Paz Office/FONAMA		
	NO EQUIPMENT NEEDED	
1.2 Santa Cruz Office/TA Contractor		
	OFFICE FURNITURE	
	Receptionist desk	1
	Receptionist chair	1
	Reception area sofa	1
	Reception area small table	1
	Desks for expatriate staff	5
	Desks for Bolivian professionals	9
	Desks for support staff	6
	Chairs for all above	20
	File cabinets, 1 per individual (4–drawer)	20
	Computer tables, 1 per individual	10
	File cabinets for project files (4–drawer)	4
	Printer tables	2
	Working room table	2
	Conference room table (for 12 or bigger)	1
	Chairs for conference room	12
	Folding chairs	8
	Bookcases for library	4
	OFFICE EQUIPMENT	
	Telephone lines	3
	Telephones	20
	Photocopier (collating function, etc.)	1
	Fax machine	1
	Typewriters	2
	COMPUTER EQUIPMENT	
	Desktop computers, 386/486SX	10
	Software package – WordPerfect v5.1	10
	Software package – Lotus v2.4	10
	Laser Printer, HPIII	3
	Dot Matrix Printer	2
	Portable Printer	2
	Surge protectors	various
	Printer Cables	various
	Laptops	4

COMMODITY LIST

OFFICE/CATEGORY	Commodity	Qty
	PROJECT SUPPORT *	
	Jeep, 4–wheel drive	4
	Trucks, 4–wheel drive	2
	Spare parts	as necessary
	Household furnishings (sets)	4
2. Policy & Institutional Analysis	**NONE**	
3. Natural Forest Management		
	TECHNICAL EQUIPMENT	
	Clinometers, perc., Suunto	5
	Measur. tapes, fibgl.plast., 30m	5
	Diam. tapes, fibgl.plast., 5m	5
	Wheeler pentaprism, opt. calip.	5
	Machetes	10
	Alum. tags for trees handwritten	10
	Aluminum nails for tags	10
	Fieldboards	5
	Fieldforms (copias xerox)	various
	Plastic tape, bright red, boxes	25
	Plastic tape, bright blue, boxes	25
	Plast.tp.,spotted red/white, bxs	10
	Paint phosphor. red, spray cans	50
	Tree injectars (type Jim Gem)	10
	Arboricide (Tardon, 2–4–5–T)	
	Chainsaws	8
	Office supplies	
	Classroom suppl.for tech.transf.	
	Supplies for publ., videos, etc.	
	"Stun guns" against snakebite	6
	Canoes for river surveys	various
	Outboard motors	various
	Portable HF radio w/solar panel & battery	2
	Binoculars	8
	Other type of binoculars	21
	Telescopes and tripods	2
	Tape recorder and microphone	1
	Cameras	2
	Tranquilizer gun equipment	2
	Ichthyology and limnology equipment	various
	Misc research equipment	various
	Camping equip (tents, sleeping bags, etc)	various
	Traps	250
	Mist nets	20
	Slide projector and screen (12 volt)	1

ANNEX D5
ECONOMIC ANALYSIS

1.0 INTRODUCTION

This report examines the economic viability of the Bolivia Sustainable Forest Management (BOLFOR) Project following the guidelines for economic analyses outlined in AID Handbook Chapter 3. The terms of reference for this component of the project paper are presented in Annex 1.

Section 2.0, below presents a brief overview of the project setting including a discussion of current trends in the use of Bolivia's forest resources. Section 3.0 provides a rationale for the economic analyses contained in this report and a discussion of information on project benefits and costs needed for monitoring and evaluation during implementation. Section 4 presents a discussion of the reasonableness of assumed project benefits and Section 5 presents a comparison of estimated benefits to planned project expenditures.

2.0 PROJECT SETTING

Bolivia has a land area of 110 million ha, roughly half of which (55.8 million ha) is forested. Eighty percent of the country's forest is found in the lowlands, and of this, approximately 24 million ha are classified as moist or very moist tropical forest (GOB 1991). Timber concessions have been granted on 22 million ha primarily in these two forest types, concentrated in the departments of Santa Cruz (14.3 million ha), Beni (4.1 million ha) and La Paz (3.3 million ha) (GOB 1991).

According to published reports, the annual value of forest production in Bolivia is approximately US$100 million per year, including US$48 million in wood product exports (mostly rough-sawn mahogany boards), US$20 million in non-wood exports such as Brazil nuts, rubber, cacao, and palm hearts, and US$30 to US$40 million in wood products sold in domestic markets (Panzer, et al. 1992, GOB 1991, Bowles 1992). Sawn wood exports have been rising rapidly since 1986 and are generally viewed as the sector having the most potential for growth.

Threats to future expansion of forest production in Bolivia include colonization and the conversion of forests to cropland and pasture, the unsustainable character of logging and other commercial activities, and the threat that foreign and domestic markets may be closed in the future to products from forests that are not sustainably managed.

Though certainly a cause for concern, deforestation in Bolivia does not at present appear to be as serious as commonly thought. Current estimates of range from 80,000 ha to 200,000 ha per year (Panzer et al. 1992, GOB 1991). According to the World Bank, 70 percent of deforestation occurs in remote colonization areas and in the coca-growing region

of the Chapare, with the balance due to forest conversion to cattle ranching and cropland in areas that are generally suited for agricultural development in the Department of Santa Cruz (Panzer et al. 1992).

A more serious threat to economic expansion in the forest sector is the unsustainable nature of current exploitation. Logging in Bolivia is extremely selective, with one species often accounting for 80 percent or more of total production. Once valuable species are cut, loggers typically move on to other areas. In older concessions, such as those near Santa Cruz, supplies of export quality wood are essentially gone. At current rates of harvest, commercial stands of mahogany and other valuable species could be exhausted within the next 20 years.

Factors contributing to unsustainable logging include: high transport costs, lack of government enforcement of existing regulations, lack of information and technical capacity to develop and implement rational management, and a timber pricing system that encourages wasteful and inefficient production.

Related to current management is the threat that domestic and international pressure may soon lead to sharp reductions in the demand for products from forests that are not being managed sustainably. Some 200 city councils in Germany, for example, have banned the use of tropical timbers altogether, as have half the municipalities in the Netherlands (Johnson and Cabarle 1993). In the U.S., several states and cities including New York, California, Arizona, and Minneapolis have banned or are considering banning the use of tropical timbers in public construction projects. The Califomia statute would prohibit the purchase of tropical hardwoods except those from certified sources (Johnson and Cabarle 1993). Similarly, the International Tropical Timber Organization has endorsed a proposal that would require member countries to buy and sell only from sustainable sources by the year 2000. These actions have found considerable support from organizations in Bolivia.

3.0 RATIONALE FOR FINANCIAL AND ECONOMIC ANALYSES

The BOLFOR project has four main components: (1) research and training; (2) natural forest management; (3) policy and institutional analysis; and (4) product development. The project seeks to affect current trends in forest exploitation by providing the biological and economic data needed to assess current management, design more sustainable management strategies, and develop policy prescriptions that will promote more efficient and sustainable resource use. The project will also: provide training and capacity building to improve management and policy enforcement; provide management demonstration in the context of research, training and capacity building; promote widespread dissemination of project findings and recommendations to increase pressure for public and private sector policy and investment changes; and, promote market development and provide technical assistance to the private sector as needed and appropriate to increase the value of forest resources and the efficiency with which they are used.

To help determine the desirability of planned project investments, standard evaluation procedures call for some combination of net present value (NPV), internal rate of return

(IRR) or benefit cost (B/C) analysis. Project benefits can fall into one or more of three categories: private, public/social, and non-quantifiable. Where costs and benefits can be quantified and the benefits are private, NPV and IRR analyses are appropriate. Where the costs and benefits are public or social, the appropriate approach is NPV and B/C analysis. Where costs and/or benefits are not quantifiable, several options are available. For example, if costs can be quantified but benefits cannot, the cost flows stemming from a number of competing project designs can be compared to determine which design represents the least-cost solution. In other cases, very rough estimates of costs and benefits can be made and a sensitivity analysis performed to indicate the marginal feasibility of the project.

The BOLFOR Project concentrates on laying the groundwork for policies and investments that will yield economic benefits in the future, or "second tier" results. The forest research component, for example, will provide the basis for more sustainable and efficient management techniques and improved natural resource policies-the first tier. Over time, the adoption and implementation of the new techniques and policies will result in measurable financial and economic benefits the second tier. However, it is not possible to specify in advance precisely what techniques will be developed, what policies proposed, or the extent to which either will be adopted, or in the case of policies, actually enforced. It would therefore be difficult to provide ex ante evaluations for most project components.

Nevertheless, rough estimates of the type of private sector impacts that may result from project investments can be made and compared to planned project expenditures. An analysis of this sort is presented in Section 5.0. In addition, some measure of the reasonableness of project expenditures can be gained by comparing them to the value of the resource at risk from unsustainable management. This comparison is presented in Section 4. Finally, as measurable second-tier impacts will become clearer during project implementation, it is desirable to have a plan to begin measuring the benefits and costs of specific project activities in the future. The recommended approaches for each project component are discussed below in Sections 3.1 to 3.5 (see also studies proposed in the Policy Component).

3.1 Research

The primary focus of the research component is to determine what constitutes sustainable management and how current management will need to be changed to achieve it. Assessing the costs and benefits of this component will require information on the financial and environmental impacts of recommended management changes. Costs will include direct project outlays for research as well as the costs of recommended changes in private sector investments and in the level, timing, and species composition of production. Benefits will include additional revenues and any increase in environmental amenities or ecosystem services generated by changes in recommended management. Examples of the latter might include improvements in water quality, aesthetic value of the forest, or the size and health of populations of flora and fauna affected by commercial activities.

Baseline data will be needed in order to identify with- and without-project impacts. In addition, data or a range of estimate will be needed on the rates and timing of private sector adoption of project recommendations.

3.2 Training

The benefits of investments in training are difficult to measure precisely. Certainly, Bolivia will need more and more highly trained personnel in both the public and private sectors before significant improvements in forest management can be realized. However, even in an ex post analysis, it would be difficult to attribute specific changes in management to particular investments in training. As a result, apart from the analyses presented in Sections 4 and 5, no effort will be made to evaluate the financial or economic benefits from training. Instead, a cost-effectiveness analysis of planned training expenditures is provided in the project financial analysis.

3.3 Natural Forest Management

The general procedures for evaluating the cost-effectiveness and overall returns from project investments in forest management are similar to those discussed above for research.

3.4 Policy and Institutional Analysis

Since it is not possible to attribute specific changes in on-the-ground management to policy changes that may be proposed or implemented as a result of the project, no effort will be made to evaluate the benefits of investments in this project component. Nevertheless, a major objective of the project policy component will be to estimate the relative costs and benefits (both financial and economic) of alternative natural resource policies in an effort to influence the type of policies that are proposed and implemented in the future.

The policy component will also provide ongoing evaluation of the financial and economic implications of project findings and recommendations. Beyond providing estimates of the expected returns from project investments, these evaluations should help to improve project performance by focusing efforts on activities with the highest marginal payoff.

3.5 Product Development

A range of assistance for a number of commercial activities is being considered under this project component. The project may, for example, provide technical and marketing advice to cusi, palmito, or value-added wood products enterprises. To date, however, no specific enterprises or types of assistance have been selected for project implementation. As a result, evaluation of this project component is confined to the analyses provided in Sections 4 and 5.

Activities chosen during implementation will be selected based on the following criteria: financial and economic returns, social and ecological impacts, and relevance and contribution to the overall goals and objectives of the project.

4.0 REASONABLENESS OF ASSUMED BENEFITS

As discussed above, most benefits stemming from the BOLFOR Project are either difficult to quantify in advance or hard to measure in general due to a lack of established markets for particular outputs such as biodiversity. A decision to accept the project under these circumstances implicitly assigns a minimum value to project benefits equal to the proposed budget, i.e., US$20 million, or roughly US$2.9 million per year for seven years.

One way to consider whether benefits of this magnitude are reasonable is to compare planned project expenditures to the value of forest production in Bolivia, that is, to one component of the value of the resource whose use the project is trying to influence. As noted, although there are no reliable statistics on the production and marketing of forest products in Bolivia, various sources indicate that the value of registered production for both domestic and international markets is approximately US$100 million per year (Panzer et al. 1992, Bowles 1992). According to one source, real production exceeds registered production by as much as 50 percent (Panzer et al. 1992). Assuming the lower figure of US$100 million per year, the gross nominal value of wood products output over a 15-year period would equal US$1.5 billion.

Project expenditures therefore represent roughly 3.0 percent of the annual value of the country's forest production and 1.5 percent of its value over 15 years (some project benefits, such as basic information on the growth and reproduction of commercial tree species, are likely to accrue well after the project has ended).

It should be emphasized that the above estimates exclude a significant portion of the value of Bolivia's forest resources. In particular, they do not include: a) the value of products collected for local use such as fish and wildlife, thatching, and construction materials, and b) nonmarket values such as biodiversity, aesthetics, and watershed protection.

When viewed in this light, project expenditures do not seem unreasonable. Governments routinely spend far more on information and training to ensure that petroleum and agricultural resources of an equal value are developed in an efficient manner, yet virtually nothing has been invested in the basic research and training needed to efficiently manage forests in Bolivia. Although dramatic changes in management may not result from this project alone, it is clear that the country's forest resources cannot be managed sustainably or efficiently without the type of information and capacity building that the project aims to provide.

5.0 COMPARISON OF PLANNED EXPENDITURES AND POTENTIAL BENEFITS

A second method of assessing the reasonableness of project investments is presented in Table 1. The table compares planned annual expenditures to estimates of the type of benefits that may result from these expenditures in the future. Assumptions used in developing the

table are listed below. This is followed by a brief discussion of the figures presented in the table.

5.1 Assumptions for Illustrative Example

1. All figures are in real U.S. dollars.

2. Present values are calculated using two rates of discount (3 percent and 25 percent) representing a range of social opportunity costs (CITE), and an IRR is calculated.

3. Total project expenditures are spread evenly over the 7-year life of the project (i.e., $2.86 million per year).

4. Every effort was made to develop conservative estimates of the results of project activities. Nonmarket outputs are excluded from the analysis.

5. Benefits are attributed to 3 project components (product development, research and training, and natural forest management) and are assumed to begin accruing in years 3 and 4 and to continue until year 15. The policy and institutional analysis component is assumed to contribute to benefits stemming from other project activities as noted.

6. Three revenue streams are projected for product development activities. Each is $140,000 per year or roughly the size of the tagua marketing project initiated in Ecuador by Conservation International (CI 1992). Scenarios that might account for these benefits include:

- An existing palmito plant in Santa Cruz has annual gross revenues of approximately $700,000. Project activities result in an increase in foreign sales beginning in year 3, 5, or 7 of the Project equivalent to net economic benefits of $140,000.

- A small eco-tourism enterprise with annual net economic benefits of $140,000 begins operations in Alto Madidi in year 3, 5, or 7. Alternatively, project efforts to promote tourism result in an increase in net economic benefits from nature tourism in Santa Cruz of $140,000 per year.

- Lumber exports currently account for a large share of Bolivian timber production. Raw material that does not meet the dimensional requirements for lumber is often discarded in enormous quantities. Project activities result in the creation of a new wood-products enterprise (with net annual economic benefits of $140,000 per year) specializing in mahogany turning stock for furniture legs or other products made from material currently left as scrap.

7. Projected benefits are based on documented returns from research, training and management investments in agriculture (very little research has been done on the value of investments in forestry). For example, in a survey of approximately 50 studies of projects

with agricultural research components, Ruttan (1980) found returns ranging from 11 percent to 130 percent per year. All but 9 studies reported annual returns greater than 30 percent.

The figures presented in Exhibit D5-1 are hypothetical, worst case scenario assumptions, and include returns from investments in policy and institutional analyses.

Examples of project outputs that might result in higher private sector revenues include:

Increased regeneration of commercial timber species. At present, little or no active reforestation is occurring in Bolivia. Project spending on research, training, natural forest management, and policy may to lead to added investments in enrichment planting and natural regeneration that will in turn contribute to larger commercial timber harvests in the future.

Improved timber utilization. Only about half the usable timber volume from trees currently harvested in Bolivia is removed from the forest, and of this, half again is lost to careless or inefficient milling. Project activities could add significantly to private sector revenues by promoting better wood utilization in logging and milling.

Reduced damage to residual timber. Wasteful and inefficient felling techniques and poor road design cause extensive damage to valuable residual timber in Bolivian forests. Project activities aimed at reducing this damage could lead to marked increases in future timber production at little additional cost to current producers.

Exhibit D5–1
Bolivia Sustainable Forest Management Project: Comparison of Estimated Benefits to Planned Project Expenditures

	Year *																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Totals
Benefits:																	
Prod Devel Activity #1	0	0	140	140	140	140	140	140	140	140	140	140	140	140	140	140	1,960
Prod Devel Activity #2	0	0	0	0	140	140	140	140	140	140	140	140	140	140	140	140	1,680
Prod Devel Activity #3	0	0	0	0	0	0	140	140	140	140	140	140	140	140	140	140	1,400
Res/Train/for Mgmt	0	0	0	471	990	1,560	2,188	2,407	2,647	2,912	3,203	3,524	3,876	4,264	4,690	5,159	37,891
Bens (Undiscounted)	0	0	140	611	1,270	1,840	2,608	2,827	3,067	3,332	3,623	3,944	4,296	4,684	5,110	5,579	42,931
Pres Value Ben (3%)	0	0	132	558	1,124	1,580	2,172	2,284	2,404	2,533	2,672	2,821	2,981	3,152	3,336	3,533	31,282
Pres Value Ben (25%)	0	0	79	258	402	437	464	377	307	250	204	167	136	111	91	75	3,358
Costs:																	
Costs (Undiscounted)	2,857	2,857	2,857	2,857	2,857	2,857	2,857	0	0	0	0	0	0	0	0	0	19,999
Pres Value Costs (3%)	2,857	2,771	2,688	2,608	2,529	2,453	2,380	0	0	0	0	0	0	0	0	0	18,286
Pres Value Costs (25%)	2,857	2,143	1,607	1,205	904	678	508	0	0	0	0	0	0	0	0	0	9,902
Present Net Value:																	
Pres Net Value (3%)	(2,857)	(2,771)	(2,556)	(2,050)	(1,405)	(873)	(208)	2,284	2,404	2,533	2,672	2,821	2,981	3,152	3,336	3,533	12,996
Pres Net Value (25%)	(2,857)	(2,143)	(1,528)	(947)	(502)	(241)	(44)	377	307	250	204	167	136	111	91	75	(6,544)

* Year "0" is first year of the Project

Memo:

IRR = 10.1%
B/C @ 3% = 1.71
B/C @ 25% = 0.34

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ANNEX D6
FINANCIAL ANALYSIS

This annex contains detailed information on the project's costs, including spreadsheets showing expenditures for all seven years of the project and cost notes/assumptions. The annex also analyzes several aspects of the project's design, including:

- Purchase versus rental of airplanes through FAN
- Sustainability
- Impact of certification
- Procurement costs

The annex is organized in two parts, with the first part summarizing the financial analysis and the second part presenting the financial plan or budget.

1.0 ANALYSIS

1.1 Purchase Versus Rental of Airplanes Through FAN

The project design team reviewed several alternatives for providing airtime to the implementation team, including purchase of a plane and per hour or per month rental from private companies, and some type of guaranteed access to airtime when needed through FAN. The last alternative was selected because it was not only the most cost effective, but the most reliable.

Access to reliable, well maintained aircraft is important to the project's success, since many forest sites are located at some distance from Santa Cruz and the roads are often impassable during the rainy season. The design team estimated that an average of twenty hours of air time per month or 240 hours per year will be required in each year of the project. This time will be used to fly to and from the sites; overfly the areas for observational purposes; move trainees, long- and short-term advisors, visitors, and GOB and AID management personnel in and out of ground locations; provide food and equipment to researchers on the ground; and take aerial photographs for monitoring purposes. The time estimates are based on experiences with projects of a similar nature, such as the research presently being conducted by CI in the Bosques Chimanes and jointly by FAN and WSC in the Rios Blanco y Negro.

PL 480 funds totaling $250,000 will be granted to FAN, which will acquire new facilities. In return for this grant, FAN will agree to provide the BOLFOR project with complete air support from its fleet of planes over the project life at cost. Thus, FAN will be providing services of its fleet of aircraft, pilots and maintenance crew. An important factor in this decision and the analysis was the maintenance and reliability of the aircraft. FAN has an in-house maintenance capability and is known for reliable aircraft. Private rental

companies are not always reliable (i.e. aircraft are not always available as they are promised) and aircraft are not as carefully maintained.

FAN was selected over other organizations because it is the only non-profit organization equipped to provide the services and the only one operating services of this type in the project area.

The costs of providing funds to FAN versus renting from private companies are summarized below. A more complete analysis is contained in Attachment A.

	FAN	Company #1	Company #2
Rental cost/hour	$ 220	$ 350	$ 440
Rental cost/year	$ 52,800	$ 84,000	$105,600
Rental cost, 7 years (with 4% inflation/yr)	$417,030	$663,457	$834,060
	---	---	---
Aircraft/facilities Donation	$250,000	0	0
Subtotal	$667,030	$663,457	$834,060

In conclusion, this analysis shows that on cost alone FAN is only about $4,000 higher than company #1 and considerable lower than company #2. However, in view of the factors such as access to its fleet of planes, maintenance, dedication to similar activities, etc., the difference is negligible and thus represents the most effective use of these monies.

1.2 Sustainability

Project sustainability can be assessed in term of the costs of continuing the activities of the project after AID funding terminates.

Prior to assessing costs, the types of activities which are important to continue have to be understood. The project will fund considerable research and training and provide foreign and local technical assistance during its early years. This assistance tapers off in the latter years. Many of the activities will be carried out to build Bolivians' capacities to conduct the work on their own (i.e., institutional strengthening and human resource development through training); other activities, particularly research, are designed to prove or assess approaches or methodologies to natural forest management or to sustainable harvesting of timber and non-timber forest products. Once the initial research and investigation is completed and techniques or methodologies are determined, additional research on the same topic will not necessarily be required.

This is not to say that continued research (to obtain solutions) and training (to continue to build capacity) is not important and desirable; nor that some research could be inconclusive or require additional work beyond that originally contemplated; nor that all the solutions are found and no further research will be needed. Rather, project activities are expected to provide some important, fundamental recommendations and solutions that will lead to substantial improvements in how Bolivia's forests can be managed sustainably and what techniques have to be applied to obtain certification.

Thus, the true costs of sustainability relate more to the costs of continuing the oversight, monitoring and enforcement, than to continuing the full array of project activities. The local currency budget provides funding for staff and operational expenses for the GOB agencies involved (e.g. the MDSMA, FONAMA, and CDF).

THE MDSMA. The Ministery for Sustainable Development and the Environment. The project will pay the staff and operational costs for policy, monitoring and evaluation, and communications specialists (three persons). On a yearly basis these costs total approximately $42,000 for staff and $7,000 for operational expenses. These costs are somewhat high in relationship to earlier FONAMA and SENMA staffing and its heretofore non-existent operations at a regional level. However, the costs are not high in absolute terms nor in staff terms (only several people are involved). The question thus is more one of timing and will to carry out the requirements of the law. The project will not provide excessive funding to the MDSMA and thus will not cause an increase to its staffing and operational costs in a disproportionate manner.

CDF (or its replacement, as applicable). The project anticipates paying the staff and operational costs of two persons, a policy specialist and a forester. On a yearly basis, these costs are approximately $46,000 for staff and $3,000 for operational expenses and in relation to CDF's operational costs in Santa Cruz are very small. Thus, CDF should be prepared to absorb these additional staff with no difficulties. Even if CDF were not prepared to do so, however, the project will be working with and training other CDF professionals and technicians. Thus, the techniques and methodologies to be ascertained in this project and the forest management planning and oversight that is initiated should easily be able to be continued as long as CDF or any successor agency has the will and mandate to do so.

On this basis, the costs of sustainability are seen as very modest.

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1.3 Impact of Certification

Certification will provide both a market incentive and enforcement mechanism for timber and non-timber product exports. The project has been designed on the assumption that the international community (i.e., primarily importers from the U.S., Japan and the European market) will limit/prohibit imported timber from tropical forests unless it is certified as being produced in a sustainable manner. Likewise, for non-timber products, the project will be involved in supporting production, processing and sales, only if the product is ecologically sustainable and thus will target green (niche) markets as a part of the marketing strategy. For both timber and non-timber products, sustainable production and certification is projected to carry a price premium; that is the importer is expected to pay more for the product. This is because demand for certified products will increase over non-certified ones and in time there might not be any non-certified ones available to the consumer. Thus, certification is expected to help increase the value of forest products and provide an incentive to concessionaires to manage their lands sustainably. The project aims to demonstrate that sustainable management is economically viable, that is that the costs are not excessive and are worth the benefits.

What would be the impact on the project if the international community does not limit/prohibit imports? What would be the financial implications?

At the outset, the project design would not be changed significantly if the certification requirement did not occur. This is because much of the research and analysis planned for the first 18-36 months would still have to be conducted to establish the economic and ecological factors, techniques and methodologies for sustainable management. Further, these techniques and methodologies would still have to be promoted and extended to the forest industry, presumably on the basis that they are worth adopting for economic and ecological reasons. The impact would come primarily in the product development component. This is because the production and marketing activities would most likely change, as the size and strength of the green market might not be as significant as it would be with certification. Further, the project would probably have to focus more on the "stick" of enforcement, rather that the "carrot" of an incentive due to higher prices for certified products.

The financial implications during implementation are not clear; on the surface the costs of carrying out the project would not be affected. The primary implication is that the project would have to be redesigned to account for what would be a failure in the international timber importing countries. This is likely to mean that the project would focus less on market forces as incentives for sustainable management and more on enforcement of current and perhaps new laws banning cutting of trees and harvesting of non-sustainable products. This would prove to be difficult and very costly to the Bolivians, as the ability to enforce these laws is currently very weak. In effect, without certification, the chances of success in the project and over the long run in terms of protecting biodiversity and reducing deforestation are substantially reduced.

1.4 Procurement Costs

Procurement will be managed by AID, the contractor, and FONAMA. AID will procure vehicles and household furnishings and appliances, the contractor will procure the more sophisticated technical supplies and equipment requiring foreign exchange, and FONAMA will procure a limited amount of project supplies and equipment that are available off the shelf in Bolivia. In all cases except the household furnishing and appliances, the contractor's advisors will be providing advice on the specifications required for the commodities. The costs of this approach can be analyzed as follows:

AID. USAID/Bolivia routinely purchases vehicles and household appliances for other projects as well as its own operational needs. Thus, the mission is seen as having an advantage in terms of sources of supply, cost effectiveness, familiarity with specifications and experienced in-house staff. AID will be responsible for about $250,000 in goods.

Contractor. The contractor will utilize its in-house procurement staff or an outside procurement agent familiar with USG procurement regulations. An estimated 8 person months of time are estimated for the procurement (i.e., preparing and issuing bidding documents, evaluating and selecting bids, preparing and signing procurement contracts, inspecting equipment in some cases, arranging for and tracking shipments and payment of invoices). The list of commodities is included in this annex and contains a wide variety of items; thus this procurement is rather labor intensive. Most of the commodities are likely to be procured in three batches, one for computer hardware and software and two for the technical supplies and equipment. In addition, there is likely to be an occasional small value procurement undertaken and shipment arranged as part of the excess baggage of a short-term advisor or home-office specialist member of the contract team.

The value of these commodities is estimated at $640,000, including about 15 percent for shipping. The cost of 8 months of the contractors effort (including salary, fringe, overhead and fee) is about $54,000 or about 8 percent of the total value of the commodities. This cost is seen as being quite reasonable in relation to the value of the commodities and considering the varied nature (many different items) of the procurement.

MDSMA. The MDSMA (probably through its entity, FONAMA) will procure locally available items, following Bolivian government guidelines as well as those that may be applicable to PL 480 funds. FONAMA has done some procurement of goods under other donor programs. The commodities which will be procured locally are not sophisticated and in many cases will be available in retail or wholesale "hardware" stores. The value of commodities funded through local currency will total about $235,000. One person on the MDSMA/FONAMA staff, with assistance from the TA contractor and an accountant/bookkeeper, will be responsible for the procurement. Thus, this is seen as a very cost effective way in which to procure these goods.

2.0 FINANCIAL PLAN

The tables and cost notes which follow contain the financial plan.
Annex D6 Financial Analysis - Attachment 1 (four pages)

ANNEX D6: FINANCIAL ANALYSIS

ATTACHMENT 1

COST ANALYSIS OF FINANCIAL LEASE OF AN AIRPLANE

ASSUMPTIONS

a) The plane required must have a capacity to carry 6-10 persons.
b) The minimum estimated fly time is around 20 hours per month.
c) The annual inflation rate of 4% is accumulated.

CONSIDERATIONS

This analysis takes into account the following factors:

i) type of airplane
ii) quality of service
iii) security

With these considerations we evaluated three offers quoted with the following characteristics:

The type of airplanes they use are Aircommanders
The quality of service offers new and comfortable airplanes.
The airplanes to be rented have a regular mechanical maintenance.

ANALYSIS

Based on the data previously elaborated, we have two approaches:

In the first approach we compare the offer of FAN against the offers from Aeroitenez and Rene Arce. Detailed comparisons are presented in Tables 1, 2 and 3.

The cost of leasing FAN's services compared to other entities is as follows:

(U.S. dollars)

	SERVICE	DIFFERENCE
F.A.N.	417,029.95	
AEROITENEZ	663,456.74	246,426.79
RENE ARCE	834,059.90	417,029.95

In the second approach we increased FAN's offer by 50%, and compared it with the quotes presented by Aeroitenez and Rene Arce. The detail is presented in Tables 4, 5, and 6.

The summary of the cost of leasing FAN's service compared to the other entities is as follows:

(U.S. dollars)

	SERVICE	DIFFERENCE
F.A.N. plus 50%	625,544.92	
AEROITENEZ	663,456.74	37,911.82
RENE ARCE	834,059.90	208,514.98

CONCLUSION:

One assumes that if the project negotiates with the other entities and explains the development and need of air time required, over a seven year period, the project should be able to get lower prices.

However, based on the above analysis, FAN's quote is less costly to the project even if this quote increases by 50% over the original price offered.

TABLE #1

COST PROJECTION F.A.N.

COMPONENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	TOTAL
1. Air Time per month	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
2. Air Time per year (hours)	240.00	240.00	240.00	240.00	240.00	240.00	240.00	1,680.00
3. Cost of rental per hour (*)	220.00	228.80	237.95	247.47	257.37	267.66	278.37	248.23
4. Cost of rental per year	52,800.00	54,912.00	57,108.48	59,392.82	61,768.54	64,239.27	66,808.84	417,029.95

(*) Includes accumulated inflation of 4%

TABLE #2

COST PROJECTION "AEROITENEZ"

COMPONENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	TOTAL
1. Air Time per month	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
2. Air Time per year (hours)	240.00	240.00	240.00	240.00	240.00	240.00	240.00	1,680.00
3. Cost of rental per hour (*)	350.00	364.00	378.50	393.70	409.45	425.83	442.86	394.91
4. Cost of rental per year	84,000.00	87,360.00	90,854.40	94,488.58	98,268.12	102,198.84	106,286.80	663,456.74

(*) Includes accumulated inflation of 4%

TABLE #3

COST PROJECTION "CAP. RENE ARCE"

COMPONENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	TOTAL
1. Air Time per month	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
2. Air Time per year (hours)	240.00	240.00	240.00	240.00	240.00	240.00	240.00	1,680.00
3. Cost of rental per hour (*)	440.00	457.60	475.90	494.94	514.74	535.33	556.74	496.46
4. Cost of rental per year	105,600.00	109,824.00	114,216.95	118,785.65	123,537.06	128,478.55	133,617.69	834,059.90

(*) Includes accumulated inflation of 4%

TABLE #4

COST PROJECTION F.A.N. PLUS 50%

COMPONENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	TOTAL
1. Air Time per month	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
2. Air Time per year	240.00	240.00	240.00	240.00	240.00	240.00	240.00	1,680.00
3. Cost of rental per hour (*)	330.00	343.20	356.93	371.21	386.05	401.50	417.56	372.35
4. Cost of rental per year	79,200.00	82,358.00	85,662.72	89,089.22	92,652.80	96,368.91	100,213.27	625,544.92

(*) Includes accumulated inflation of 4%

TABLE #5

COST PROJECTION "AEROITENEZ"

COMPONENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	TOTAL
1. Air Time per month	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
2. Air Time per year (hours)	240.00	240.00	240.00	240.00	240.00	240.00	240.00	1,680.00
3. Cost of rental per hour (*)	350.00	364.00	378.56	393.70	409.45	425.83	442.86	394.91
4. Cost of rental per year	84,000.00	87,360.00	90,854.40	94,488.58	98,268.12	102,198.84	106,286.80	663,456.74

(*) Includes accumulated inflation of 4%

TABLE #6

COST PROJECTION "CAP. RENE ARCE"

COMPONENT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	TOTAL
1. Air Time per month	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
2. Air Time per year (hours)	240.00	240.00	240.00	240.00	240.00	240.00	240.00	1,680.00
3. Cost of rental per hour (*)	440.00	457.60	475.90	494.94	514.74	535.33	556.74	496.46
4. Cost of rental per year	105,600.00	109,824.00	114,216.96	118,785.64	123,537.06	128,478.55	133,617.69	834,059.90

(*) Includes accumulated inflation of 4%

ANNEX D6: FINANCIAL ANALYSIS. ATTACHMENT 2

BUDGET ASSUMPTIONS

INTRODUCTION

Salary rates for different personnel have been calculated using one of three multipliers developed for the purposes of this budget.

Long-term professional staff (expatriate and Bolivian) and Short-term expatriates: the salaries for long-term professional staff have been calculated using a weighted average multiplier of 2.36 which includes the overhead, fringe, general & administrative, and fee rates of all Consortium members (Chemonics, TR&D, CI, WCS).

Short-term professional staff (Bolivian): their salaries have been calculated using a weighted average multiplier of 1.90 which includes the overhead, fringe, general & administrative, and fee rates of all Consortium members. Since the overhead and fringe rates charged on short-term professional salaries is usually lower, we have calculated this second and lower multiplier.

Support staff: the salaries for support staff have been calculated using a multiplier of 1.40 to cover required local fringe benefits such as life and medical insurance, severance pay (if necessary) and social security taxes.

Counterpart staff: The salaries for counterpart staff have been calculated using a multiplier of 1.20 to cover fringe benefits such as life and medical insurance, severance pay (if necessary) and social security taxes.

1. MANAGEMENT/ADMINISTRATION

1.1 La Paz/MDSMA

a) Staff

All five staff members are considered to be full-time positions supporting the BOLFOR project for the LOP. Their salaries include the 13th month bonus paid at the end of the calendar year.

Coordinator (base salary) - $24,000 per year
Project Officer/La Paz (base salary) - $12,000 per year
Accountant (base salary) - $ 12,000 per year
Secretary (base salary) - $6,000 per year
Field Representative/Santa Cruz (base salary) - $18,000 per year

b) Operations Costs (L/C)

- Equipment Maintenance: $300/year in years 1 and 7, and $400/year in years 2-6.

- Office Supplies: Budgeted at $1,500 for year 1; $2,000/yr in years 2 and 7; and $2,500/yr for years 3-6.

- Phone/Fax/Tlx: Estimated at $1,200 in the first year; $1,500 per year for years 2-6; and $1,000 in year 7.

- Postage & Misc: $500 in the first and last year, and $800 per year for years 2-6 to cover postage and courier expenses.

- Reproduction Costs: Estimated at $600 in year 1; $800/yr in years 2-6; and $492 in year 7 to cover everyday photocopying jobs.

- Publishing/Printing/Editing: For the production of project-related newsletters, brochures, pamphlets, and other printed materials, we have estimated $2,500/yr in years 1 and 7, and $6,000 per year in years 2 through 6.

- Planning Workshop: $5,000/yr for Years 1-6.

c) Travel & Per Diem

- In-country (La Paz/Santa Cruz) Travel & Per Diem:

To cover the expenses of in-country trips by the MDSMA representative, Coordinator, Project Officer, Field Representative and Accountant. We have budgeted 22 trips in Year 1, and 18 trips/yr in Years 2-7. The round trip fare between La Paz-Santa Cruz is budgeted at $150. Estimated 3 days per trip at the average per diem rate of $90 (this average per diem rate is based both on AID allowable per diem for TA contractor staff and on lower per diem rates for counterpart staff).

- Field Travel and Per Diem:

Estimated that 60 days a year will be spent by MDSMA staff visiting the project pilot sites. The field per diem rate is $20/day.

- Local Transport:

We are budgeting $10/day to cover taxi and local transportation costs during in-country travel in Santa Cruz and La Paz.

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d) **Commodities & Freight.** None budgeted.

e) **Evaluations.** None budgeted

f) **Audits.** None budgeted.

g) **Grants to NGOs.** Estimate a total of $345,000 LC in grants to NGOs.

h) **Certification Unit.** $30,000 LC in year 3 and $27,000 LC in year 4. Estimate a total of $57,000 LC. These are funds required to underwrite certification costs during the first years. Monies from other sources will be obtained beyond years 3 and 4.

i) **Contingency**

We are budgeting a 5% contingency rate on total local currency costs.

1.2 Contractor

1.2.1. Home Offices (Consortium)

a) **Staff**

Includes funds to cover the time spent by the Consortium's home office technical, supervisory and administrative staff to support the project. Salaries have been calculated using a weighted average multiplier of 2.36. Please refer to the LOE table for the LOE distribution over the LOP.

- Project Supervisors: Estimated at the AID maximum salary rate of $86,500/year (rounded).
- Project Administrators: Estimated at the average salary rate of $30,000/year.
- Field Accountant: Estimated average salary at $37,100/yr. To install accounting systems in the field office.
- Logistics Support: Estimated average salary at $25,900/yr. Will provide logistics support to procurement of project commodities.
- Procurement Specialist: Estimated average salary at $40,300/yr. Will procure project commodities.
- Procurement Agent: Estimated average salary at $25,900/yr. Will procure project commodities working in conjunction with procurement specialist.

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- Communications Specialist: Estimated average salary at $28,600/yr.
- Management Information Systems Specialist: Estimated average salary at $47,800/yr.
- Participant Training Specialist: Estimated average salary at $48,400/yr.

b) Operations Costs

- Phone/Fax/Tlx: Estimated at $5,000 in Year 1 and at $6,500/yr in Years 2-7.
- Office Supplies: Estimated at $4,000 in Year 1, at $4,500 in Years 2-6 and at $4,000 in Year 7.
- Postage & Misc: Budgeted at $2,000/yr for each year of the project.
- Reproduction Costs: Budgeted at $4,000 per year for each year of the project.
- Printing & Translations: Budgeted at $1,500 in Year 1, $1,600/yr for Years 2-6 and $1,500 in Year 7.
- DBA: DBA insurance is costed at the current rate of 2.79 percent of total remuneration for home office staff.
- MEDEX: MEDEX is standard medical evacuation insurance that covers evacuation costs when required. Budgeted at the current rate of $17/month.
- Passports and Visas: An estimate of $50/international trip is included to cover the cost of passports and visas.
- Airport Tax: An estimate of $20/international trip is budgeted to cover the cost of airport departure tax.
- Medical Exams: The AID maximum of $100 per medical exam is budgeted for home office staff.
- Inoculations: Inoculations are budgeted at $30 for each international trip.

c) **Travel & Per Diem**

- International Travel & Per Diem:

Includes funds for travel from the Consortium Home Offices to the project offices by any of the Home Office staff members on billable assignments. Estimated 9 trips in Year 1, 7 trips in Years 2 & 3, 4 trips in Year 4, and 3 trips in Years 6 & 7. The average length of stay is 14 days. Airfare is budgeted at $1,600 per round trip. Per diem is calculated at the average rate of $90/day.

- In-country (Santa Cruz/La Paz) Travel & Per Diem:

Estimate that half of the home office staff members on billable assignments travelling to the project offices will require in-country travel (either to La Paz or Santa Cruz). Round trip ticket is budgeted at $150.

- Local Transport:

We are budgeting $10/day to cover taxi and local transportation costs during in-country travel in Santa Cruz and La Paz.

d) **Inflation**

Estimated at 4% of all costs for Years 2 and 3, and at 5% for Years 4-7. The inflation rate has not been compounded.

1.2.2. Santa Cruz Office/TA Contractor

a) **Staff**

For LOE distribution please refer to LOE table.

1) Technical Assistance:

Long-Term Expatriate: Salary rate calculated with the 2.36 multiplier to cover overhead and fringe benefits.

LT expatriate, Chief of Party: Base salary = $86,500/yr. $86,500 X 2.36 = $204,140.

LT expatriate (residing in Bolivia), M&E/MIS Specialist: Base salary = $65,000/yr. $65,000 X 2.36 = $153,400.

Long-term Local: Salary rate calculated with the 2.36 multiplier to cover overhead and fringe benefits.

LT Local, Information Specialist: Base salary = $18,000/yr. $18,000 x 2.36 = $42,480.

LT Local, Logistics Coordinator: Base salary = $12,000/yr. $12,000 X 2.36 = $28,320.

ST Expatriate: Average daily rate of $260 or $67,600/yr. Salary rate calculated with 2.36 multiplier. $260 X 2.36 = $613.60/day.

ST Local: Average daily rate of $100 or $26,000/yr. Salary calculated with 1.90 multiplier. $100 X 1.90 = $190/day.

2) Support Staff

All support staff's salaries have been calculated using a multiplier of 1.40.

Office Manager: Base salary = $30,000/yr.
Accountant: Base salary = $12,000/yr.
Database Assistants (2): Base salary = $12,000/yr.
Senior Secretary: Base salary = $8,000/yr.
Junior Secretaries (3): Base salary = $5,000/yr.
Drivers (3): Base salary = $ 5,200/yr.
Messenger: Base salary = $3250/yr.

3) Counterpart Staff

Counterpart salaries are calculated with a multiplier of 1.20.

MDSMA M & E Specialist (residing in Santa Cruz): Base salary = $18,000/yr. $18,000 X 1.20 = $21,600.

MDSMA M&E Specialist (residing in La Paz): Base salary = $18,000/yr. $18,000 X 1.20 = $21,600.

b) Operations Costs

- Office Rental: Estimated at $1,800/month ($21,600/yr) in L/C in Years 1-5 and at $1,200/month ($14,400/yr) in L/C in Years 6-7 for rental of office space.

- Utilities: Estimated at $300/month ($3,600/yr) to cover electricity and water expenses for each project year.

- Phone Line: Estimated at $3,750 for the installation of three telephone lines. This is a one-time charge to the project.

- Equipment Maintenance: Estimated in foreign exchange at $1,000 for the first year to cover related expenses for office equipment such as photocopier, fax, typewriters, and computer equipment. Year 2 has been budgeted at $2,000. Years 3 through 7 have been estimated at $2,500/yr.

- Fuel and Vehicle Maintenance: We have budgeted $3,000 per year per vehicle for fuel expenses, or $18,000 total for the six project vehicles. We are also budgeting $2,500 for insurance and $1,000 for repairs per vehicle per year, for a total of $21,000/yr. In Year 1 we are budgeting half the total amount for fuel, insurance and repairs.

- Airplane rental: Budgeted at $26,400 in Year 1, at $52,800/yr in Years 2-5, and at $26,400/yr in Years 6-7. These yearly rates are based on an hourly rental rate of $220/hour.

- Expendable Office Supplies: Estimated at $4,000/yr in years 1 and 7; and $4,200/yr for years 2-6.

- Communications (Phone/Fax/Telex/Postage/Courier): Estimated at $1,834/month in Year 1; $4,400/month for Years 2-6; and $1,666/month in Year 7.

- Printing & Translations: Estimated at $1,600 in Year 1; $3,600/yr for Years 2-6; and $3,374 in Year 7.

- Reproduction Costs: Estimated at $8,500 for the first year to cover everyday photocopying jobs; $10,500/yr in Years 2-6; and $6,500 in Year 7.

- Legal Costs: Budgeted at $600/yr for all project years.

- Bank Charges: Budgeted at $300/yr for all project years.

- Guard Services: Budgeted at $1,800/yr for all project years.

- Conference/Fair Registration Expenses: Estimated at $1,000 in Year 1; $1,500/yr in Years 2-5; and $1,000/yr in Years 6 and 7.

- DBA: DBA insurance is costed at the current rate of 2.79 percent of total remuneration for expatriate professional staff (salary + post differential).

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- MEDEX: MEDEX is standard medical evacuation insurance that covers evacuation costs when required. Budgeted at the current rate of $170/yr for each LT expatriate and at $17/month for ST expatriates.

- Passports and Visas: An estimate of $50/international trip is included to cover the cost of passports and visas.

- Airport Tax: An estimate of $20/international trip is budgeted to cover the cost of airport departure tax.

- Medical Exams: In accordance with the revised guidelines of AID Handbook 14 (February 1991) regarding the reimbursement of medical examinations for contractor personnel, we are budgeting $300/individual for long-term expatriate team members and their dependents. For Short-term expatriate professionals the AID maximum of $100 per medical exam is budgeted. In addition we are budgeting $100 for pre-employment medical exams per local professional staff member.

- Inoculations: Inoculations are budgeted at $30 for each international trip.

- Miscellaneous Supplies: None budgeted.

c) **Travel & Per Diem**

1) U.S. Travel & Per Diem:

Orientation: Assumes that the COP and his/her spouse will travel to the home office for a 3 day orientation. We are budgeting a round-trip ticket to D.C. at $500. Per diem for these three days is budgeted at $148.

Campus Visits: Assumes that the Participant Training Specialist will make 4 trips in Year 2 and 2 trips in Year 3 to visit LT participant trainees at their university campus. We are budgeting the average round-trip fare at $500. We are estimating each visit will be of 3 days duration at the per diem rate of $148.

2) Emergency/Medical Consultation Travel:

We are budgeting one round-trip ticket at $1,600 per project year for emergency/medical consultation travel.

3) Long-term Expatriate:

- International Travel & Per Diem:

To/From Post for LT Expat: Only budgeted for the COP and dependents since we are assuming that the M&E Specialist resides in Bolivia. Budgeted one-way ticket to Bolivia at $1,100. In addition we are budgeting one day of per diem for the COP and each of his/her dependents at the average rate of $90.

International Conference/Fair: These have been budgeted every other year for each LT expatriate advisor. Average length of stay of 14 days each trip. Average round trip fare is $1,600, and average daily per diem rate for D.C. or Europe is $148.

Rest and Recuperation Travel (R&R): R&R travel calculations are based on a round-trip fare from La Paz to Panama at $700, which we understand to be Bolivia's R&R point. We are budgeting R&R travel for the COP in Years 2, 4 and 6.

Home Leave Travel: Home-leave travel is budgeted only for the COP during the third year of the contract. We are budgeting a round-trip ticket for the COP and 3 dependents at $1,600. They will also receive one day of per diem each at $148 for Home Leave travel (to/from).

- In-country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes each LT expatriate advisor will make 6 in-country trips per year. We assume the COP will make two extra in-country trips in Year 1. Average round trip fare between Santa Cruz and La Paz is $150. Budget reflects 5-day long trips at the $90/day average per diem rate.

- Field (Project pilot sites) Travel & Per Diem:

Have budgeted 3 days a month (36 days a year) for each Expatriate LTer to visit the pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation while travelling in Santa Cruz or La Paz.

2) Long-term Local

- International Travel & Per Diem:

Assumes no international trips for Local LTers.

- In-Country Travel & Per Diem:

Assumes 6 in-country trips per year for each Local LTer. Estimate 3 days per trip at average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 3 days a month (36 days a year) for each Local LTer to visit the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

3) Short-term Expatriate

- International Travel & Per Diem:

Assumes 1 international trip per Person Month of LOE. Estimate each trip to be of 30 days in duration, 25 of which will be spent in either Santa Cruz or La Paz and 5 of which will be spent in the field visiting project pilot sites. Per diem while in Bolivia has been budgeted at the average rate between Santa Cruz and La Paz of $90.

- In-Country Travel & Per Diem:

Assumes 1 in-country trip per Person Month of ST Expatriate LOE. Have budgeted fare at $150/round-trip. As mentioned above, ST Expatriates will receive the average per diem rate of $90 during the 25 days spent in Santa Cruz or La Paz.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Expatriate LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

4) Short-term Local

- International Travel & Per Diem:

No international trips for Local STers.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 1 trip every Person Month of ST Local LOE, with 5 days in duration at the average per diem rate of $90/day. Have budgeted round trip at $150.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Local LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

5) Counterpart Travel & Per Diem:

- International Travel & Per Diem:

No international trips for Counterpart Staff.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 4 in-country trips per year for each Counterpart Staff. Estimate 3 days per trip at average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 3 days per month (36 days per year) to be spent by each of the MDSMA M&E Specialists visiting the project pilot sites at a per diem rate of $20/day. Counterpart Staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation when traveling in Santa Cruz or La Paz.

6) Support Staff

No travel funds have been budgeted for Support Staff.

d) Allowances

Post Differential: Post differential has been calculated at 15% of base salary according to Standard Regs rates for Sta. Cruz. We are basing the post differential calculation on 90% of base salary. The M&E Specialist will not receive post differential. If the LTer's first year in the field starts with 6 months, then post differential has been budgeted for half only.

Living Quarter Allowances (LQA): Calculated at $18,000/year per LTer family if the LTer's first year in the field starts with 6 months, then LQA has been budgeted for half only.

Education Allowance: Budgeted at the full $3,350 per year per dependent, which is the maximum Standard Regs rate for this allowance, even when a LTer's tour of duty begins or ends with only 6 months of the year.

Moving Expenses: Budgeted at $12,850 per LTer to cover shipping and relocation expenses to post (includes ocean freight, air freight, and excess baggage expenses). Same amount has been budgeted in the year that ends the LTer's tour of duty. We are budgeting $1,750 for air freight in Year 3 for the COP during home leave.

POV (Personally Owned Vehicle): The cost of shipping a vehicle to Bolivia is included for the COP. The rate of $3,000 is based on the current cost of shipping an average-sized vehicle to Bolivia, one way only.

Storage: Budgeted at $40/month. Included a $500 pack-in and pack-out fee.

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e) Commodity & Freight

- Office Furniture: Estimated at $10,000 in FX and $25,000 in LC in the first year and $5,000 in FX and $5,000 in LC in the second year.

- Office Equipment: Estimated at $20,000 FX in the first year and $10,000/yr in FX for Years 2 and 3.

- Computer Equipment: 10 desktop and 4 laptop computers. 6 Dot matrix printers, 1 laser printer, 1 portable printer for a total of $60,000 in FX to be spent in the first year.

- GPS (2 remote stations & 1 base station) budgeted at $30,000 in FX in Yr 1.

- 2 MacIntosh computers and 1 printer budgeted at $6,000 in FX in Year 1.

- Mapping plotter (1) budgeted at $10,000 in FX in Year 1.

- TM Landsat Images on Tape budgeted at $50,000 in FX in Year 1.

- Databases (4) budgeted at $16,000/yr FX in Years 1-6 and at $8,000 FX in Year 7.

- Technical Supplies budgeted at $2,000/yr FX in Years 1 and 7, and $4,000/yr (FX) in Years 2-6. In L/C we have budgeted $2,000/yr in Years 1 and 6, and $2,500/yr in Years 2-5.

- Freight: We are calculating freight charges at 15% of the above commodity costs.

f) Training

Workshops/Seminars/Conferences: We are budgeting $2,000/yr in foreign exchange and $2,000/yr in local currency to cover the expenses of hotel or classroom rental for workshops, seminars or conferences. These events will be 1-5 days long with an estimated 15-20 people participating in each event.

g) Research

Forest Classification System: We are budgeting a total of $115,000 in foreign exchange and a total of $235,000 in local currency over the life of the project to cover the costs of a forest classification system. These costs include: aerial photography, satellite photos, ground truthing, and subcontracts or purchase orders for acquiring data or services from groups such as FAN or CORDECRUZ for this information.

h) Other Technical Expenses (budgeted in local currency)

Newsletter: Estimated a total of 24 editions of the project newsletter at a cost of $4,000 per edition.

Other Publications: Estimated a total of 15 other publications at a cost of $3,000 per publication.

Audio Visual/Editing: Estimate an Audio-Visual Designer with base salary = $10,800/yr x 1.20 for 5 years and 3 months and an editor with base salary = $10,800/yr x 1.20 for 4.75 years.

Miscellaneous Services: Estimated $6,000 per year for every year of the project.

i) Inflation

Budgeted at 4% in Years 2 and 3 and at 5% in Years 4-7. The inflation rate is not compounded.

j) Contingency

We are budgeting a 5% contingency rate on total local currency costs.

1.3 Airplane Costs

We have budgeted $250,000 in local currency to cover BOLFOR's contribution to the purchase of the FAN airfield (see Annex D6).

2. POLICY & INSTITUTIONAL ANALYSIS

a) Staff

For LOE distribution see LOE chart.

1) TA

LT, Economist (Expatriate): None.

LT, Economist (Local Professional): Base salary = $24,000 X 2.36 = $56,640.

ST (Expatriate): Average Daily Rate = $260/day x 260 days (or $67,600/yr) x 2.36

ST (Local): Average Daily Rate = $100/day x 260 days (or (26,000/yr) x 1.90

2) Support

None budgeted

3) Counterpart

MDS Policy Specialist: Base salary = $20,000/yr x 1.20 = $24,000
CDF Policy Specialist: Base salary = $20,000/yr X 1.20 = $24,000

b) Travel & Per Diem

1) Long-term Expatriate

- International Travel & Per Diem:

To/From Post for LT Expat: Not applicable.

International Conference/Fair: Not applicable.

Rest and Recuperation Travel (R&R): None budgeted under the Policy component.

Home Leave Travel: None budgeted.

- In-country (Santa Cruz/La Paz) Travel & Per Diem:

None budgeted under the Policy component.

- Field (project pilot sites) Travel & Per Diem:

None budgeted under the Policy component.

- Local Transport:

Again, not applicable.

2) Long-term Local

- International Travel & Per Diem:

Assumes no international trips for Local LTers.

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- In-Country Travel & Per Diem:

Assumes 6 in-country trips per year for each Local LTer. Estimate 3 days per trip at an average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 3 days a month (36 days a year) for each Local LTer to visit the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

3) Short-term Expatriate

- International Travel & Per Diem:

Assumes 1 international trip per Person Month of LOE. Estimate each trip to be of 30 days in duration, 25 of which will be spent in either Santa Cruz or La Paz and 5 of which will be spent in the field visiting project pilot sites. Per diem while in Bolivia has been budgeted at the average rate between Santa Cruz and La Paz of $90.

- In-Country Travel & Per Diem:

Assumes 1 in-country trip per Person Month of ST Expatriate LOE. Have budgeted fare at $150/round-trip. As mentioned above, ST Expatriates will receive the average per diem rate of $90 during the 25 days spent in Santa Cruz or La Paz.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Expatriate LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

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- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

4) Short-term Local

- International Travel & Per Diem:

No international trips for Local STers.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 1 trip for every Person Month of ST Local LOE, with 5 days in duration at the an average per diem rate of $90/day. Have budgeted round trip at $150.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Local LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

5) Counterpart Staff

- International Travel & Per Diem:

No international trips for Counterpart Staff.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 4 in-country trips per year for each Counterpart Staff. Estimate 3 days per trip at an average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 3 days per month (36 days per year) to be spent by each Counterpart Staff visiting the project pilot sites at a per diem rate of $20/day. Counterpart Staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation when traveling in Santa Cruz or La Paz.

c) Allowances

Post Differential: Not applicable under the Policy component.

Living Quarter Allowances (LQA): Not applicable under the Policy component.

Education Allowance: Not applicable.

Moving Expenses: Not applicable.

POV (Personally Owned Vehicle): Not applicable.

Storage: Not applicable.

d) Operations Costs

- DBA: DBA insurance is costed at the current rate of 2.79 percent of total remuneration for expatriate professional staff (salary + post differential). Under the Policy component, we have budgeted for ST expatriates only.

- MEDEX: MEDEX is standard medical evacuation insurance that covers evacuation costs when required. Budgeted at the current rate of $170/yr for each LT expatriate and at $17/month for ST expatriates. Under the Policy component, we have budgeted for ST expatriates only.

- Passports and Visas: An estimate of $50/international trip is included to cover the cost of passports and visas.

- Airport Tax: An estimate of $20/international trip is budgeted to cover the cost of airport departure tax.

- Medical Exams: In accordance with the revised guidelines of AID Handbook 14 (February 1991) regarding the reimbursement of medical examinations for contractor personnel, we are budgeting wherever applicable $300/individual for long-term expatriate team members and their dependents. For Short-term expatriate professionals the AID maximum of $100 per medical exam is budgeted. In addition we are budgeting $100 for pre-employment medical exams used per local professional staff member.

- Inoculations: Inoculations are budgeted at $30 for each international trip.

e) Commodities

None budgeted for this component.

f) Training

University (LT): Assume 2 students will attend 2-year M.S. program. We are budgeting cost at $25,000/yr per student. Total of $100,000 in FX.

Workshops/Seminars/Conferences: We are budgeting $2,000/yr in foreign exchange and $2,000/yr in local currency to cover the expenses of hotel or classroom rental for workshops, seminars or conferences. These events will be 1-5 days long with an estimated 15-20 people participating in each event.

g) Research

Grants (U.S.): Assumes 2 one-year grants to U.S. students for the LOP. Grants are budgeted at $15,000/grant which covers a stipend, travel to/from Bolivia, field travel and expenses, etc. Total cost $30,000 in FX.

Grants (Bolivian): We are budgeting a total of 3 one-year research grants for Bolivian students at $8,000/grant which covers a stipend, field travel, field expenses, etc. Total of $24,000 in LC.

Research assistants: We are budgeting 1 research assistant to work on policy and institutional analysis during Years 1-6 at $3,000/yr in LC. Total of $18,000 in LC.

h) Other Technical Expenses

Technical Journals, subscriptions: budgeted at $500/yr for every year of the project.

i) Inflation

Just as it was applied in the MGT/ADMIN component, an inflation factor of 4% was applied for Years 2 and 3. For Years 4 through 7, the inflation factor applied was 5%. Inflation is not compounded.

j) Contingency

We are budgeting a 5% contingency rate on total local currency costs.

3. NATURAL FOREST MANAGEMENT (NFM)

a) Staff

For LOE distribution see LOE chart.

1) TA

LT, Tropical Forester (Expatriate): Base salary = $70,000/yr x 2.36 = $165,200.

LT, Wildlife/Biodiversity Specialist (Expatriate/Bolivian Resident): Base salary = $40,000 X 2.36 = $94,400.

LT, Forester (Local Professional): Base salary = $24,000/yr x 2.36 = $56,640.

LT, Ecologist (Local Professional): Base salary = $18,000/yr X 2.36 = $42,480.

LT, Social Scientist (Local Professional): Base salary = $18,000/yr X 2.36 = $42,480.

LT, Wildlife/Biodiversity Specialist (Local Professional): Base salary = $18,000/yr X 2.36 = $42,480.

ST Student Ecologists (Expatriate): Base salary = $30,000/yr X 2.36 = $70,800.

ST (Expatriate): Average Daily Rate = $260/day x 260 days (or $67,600/yr) x 2.36.

ST (Local): Average daily rate = $100/day x 260 days (or (26,000/yr) x 1.90.

2) Support

Occasional Labor (Local): Estimated at a flat amount of $5,000 in Year 1, $10,000/yr for Years 2-6 and $5,000 in Year 7. This is to cover labor categories such as: 10 tree species identifiers, 50 forest laborers, 20 miscellaneous employees.

Data Processor (Local): Estimated at a flat rate of $960/yr for every year of the project.

3) Counterpart

CDF/Santa Cruz Forester: Base salary = $18,000 X 1.2 = $21,600/year in local currency.

MDS Research Coordinator: Base salary = $12,000 X 1.2 = $14,400.

MDS Training Coordinator: Base salary = $12,000 X 1.2 = $14,400.

b) Travel & Per Diem

1) Long-term Expatriate

- International Travel & Per Diem:

• To/From Post for LT Expat: We are assuming to and from post travel for each LT Expatriate advisor, his/her spouse and 2 dependents. Budgeted one-way ticket to Bolivia at $1,100. In addition, we are budgeting one day of per diem for each Expatriate LTer and each of his/her dependents at the average rate of $90.

• International Conference/Fair: Budgeted for every other year for each LT expatriate advisor. Average length of stay of 14 days each trip. Average round trip fare is $1,600, and average daily per diem rate for D.C. or Europe is $148.

• Rest and Recuperation Travel (R&R): R&R travel calculations are based on a round-trip fare from La Paz to Panama at $700, which we understand to be Bolivia's R&R point. We are budgeting R&R travel for the Forester and Wildlife specialists and their dependents in Years 2 and 3.

• Home Leave Travel: None budgeted.

- In-country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes each Expatriate LTer will make 6 in-country trips per year. (If LOE in one year for LTer is only 3 months, then only 3 in-country trips would be made). Each in-country trip would be 5 days in duration at the average per diem rate of $90.
Average in-country round trip fare used for Santa Cruz - La Paz is $150.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days a month (60 days a year) for each Expatriate LTer to visit the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

2) Long-term Local

- International Travel & Per Diem:

Assumes no international trips for Local LTers.

- In-Country Travel & Per Diem:

Assumes 6 in-country trips per year for each Local LTer. Estimate 3 days per trip at average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days a month (60 days a year) for each Local LTer to visit the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

3) Short-term Expatriate

- International Travel & Per Diem:

Assumes for student ecologists the cost of 1 round trip/yr for each student.

For general short-term expatriates, assumes 1 international trip per Person Month of LOE. Estimate each trip to be of 30 days in duration, 25 of which will be spent in either Santa Cruz or La Paz and 5 of which will be spent in the field visiting project pilot sites. Per diem while in Bolivia has been budgeted at the average rate between Santa Cruz and La Paz of $90.

- In-Country Travel & Per Diem:

Assumes 1 in-country trip per Person Month of ST Expatriate LOE. Have budgeted fare at $150/round-trip. As mentioned above, ST Expatriates will receive the average per diem rate of $90/day during the 25 days spent in Santa Cruz or La Paz.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Expatriate LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

4) Short-term Local

- International Travel & Per Diem:

No international trips for Local STers.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 1 trip for every Person Month of ST Local LOE, with 5 days in duration at the average per diem rate of $90/day. Have budgeted round trip costs at $150.

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- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Local LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

5) Counterpart Staff

- International Travel & Per Diem:

No international trips for Counterpart Staff.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 4 in-country trips per year for each Counterpart Staff. Estimate 3 days per trip at an average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per month (60 days per year) to be spent by each Counterpart Staff visiting the project pilot sites at a per diem rate of $20/day. Counterpart Staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation when traveling in Santa Cruz or La Paz.

6) Support Staff

No travel funds have been budgeted for Support Staff.

c) Allowances

Note: Post differential, LQA and education allowance have not been budgeted for the Wildlife/Biodiversity Specialist.

Post Differential has been calculated at 15% (according to Standard Regs rates for Sta. Cruz). We are calculating post differential on 90% of salary so as not to count the times the LT Expat advisors are away from post (international travel, R&R). If the LTer's first year in the field starts with 6 months, then post differential has been budgeted for half only.

Living Quarter Allowances (LQA) has been calculated at $18,000/year per LTer family. If the LTer's first year in the field starts with 6 months, then LQA has been budgeted for half only. Under the NFM component, we have budgeted LQA for the long-term tropical forester expatriate only. In addition, we have budgeted $700/month to cover living expenses for each of the student ecologists.

Education Allowance has been calculated at the full $3,350 per dependent per year, which is the maximum Std. Reg rate for this allowance, even when a LTer's tour of duty begins or ends with only 6 months of the year.

Moving Expenses: Budgeted at $12,850 per LTer to cover shipping and relocation expenses to post (includes ocean freight, air freight, and excess baggage expenses). Same amount has been budgeted in the year that ends the LTer's tour of duty.

POV (Personally Owned Vehicle): The cost of shipping a vehicle to Bolivia is included for the tropical forester and wildlife/biodiversity expatriates. The rate of $3,000 is based on the current cost of shipping an average-sized vehicle to Bolivia, one way only.

Storage: Budgeted at $40/month. Included a $500 pack-in and pack-out fee.

d) Operations Costs

- DBA: DBA insurance is costed at the current rate of 2.79 percent of total remuneration for expatriate professional staff (salary + post differential).

- MEDEX: MEDEX is standard medical evacuation insurance that covers evacuation costs when required. Budgeted at the current rate of $170/yr for each LT expatriate and student ecologist, and at $17/month for ST expatriates.

- Passports and Visas: An estimate of $50/international trip is included to cover the cost of passports and visas.

- Airport Tax: An estimate of $20/international trip is budgeted to cover the cost of airport departure tax.

- Medical Exams: In accordance with the revised guidelines of AID Handbook 14 (February 1991) regarding the reimbursement of medical examinations for contractor personnel, we are budgeting $300/individual for long-term expatriate team members and their dependents. For Short-term expatriate professionals and student ecologists the AID maximum of $100 per medical exam is budgeted. In addition we are budgeting $100 for pre-employment medical exams used per local professional staff member.

- Inoculations: Inoculations are budgeted at $30 for each international trip.

e) Facilities

Budgeted at a total of $250,000 in LC over Years 1-4 for the construction or rehabilitation of buildings to be used for training, research or to serve as dormitories.

f) Commodities

Major Equipment: This is to provide funds for such items as: aerial photography equipment, data loggers, portable photosynthesis system, pressure plate, diffusion phorometer, soil moisture probes, weather station, chainsaws, and electronic theodolites.

Equipment/Technical Supplies: The amount budgeted is to provide funds for soil analyses, aerial and ground-based photograph developing, clinometers, measuring tapes, diameter tapes, wheeler pentaprism, optical calipers, machetes, aluminum tags, fieldboards, fieldforms, paint, tree injectors, arboricide, chainsaws, classroom supplies, and stun guns.

Other: To provide for materials and supplies such as: surveying compasses, range finders, levels, nails, film for ground and aerial-based photography, miscellaneous tools, etc.

g) Training

University (LT): We are budgeting for 10 students to attend 2-year M.S. programs, 6 in the U.S. and 4 in a third country. Average cost per year per student is $25,000 in FX. Total of $500,000 in FX.

Short courses (U.S. or 3rd country): Assumes 3-4 week courses, e.g. at CATIE in Costa Rica at $5,000/course/person, all expenses included (travel, tuition, food and lodging, supplies). We are budgeting for 5 such courses per year in Years 2-7. Total of $150,000 in FX.

Short courses (in-country): Assumes 2-4 week courses taught by project staff or invited short term specialists. Assumes 10 students will attend each course. We are budgeting $4,000/course in FX to cover instructors' fees and $2,000/course in L/C for instructors' living costs, plus $7,500/course in LC to cover student (10) living expenses and supplies. Total cost per course is of $13,500. We are budgeting a total of 7 such courses during the LOP at a total of $28,000 in FX and $66,500 in LC.

Semester program (in-country): No funds budgeted, because we assume this program will be conducted in conjunction with e.g. the Instituto Ecológico.

Workshops/Seminars/Conferences: We are budgeting $2,000/yr in foreign exchange and $2,000/yr in local currency to cover the expenses of hotel or classroom rental for workshops, seminars or conferences. These events will be 1-5 days long with 15-20 people participating in each event.

Student Projects: We are budgeting 5 student projects @ $2,000/project in Years 2-6. Total of $50,000 in LC.

Field Training: We are budgeting a 4-week annual field course in Years 2, 3 and 4 at $30,000/course which covers facility rental, operational expenses, supplies, and food and lodging expenses. Total of $90,000 in LC.

Honoraria, invited trainers: We are budgeting $20,000/course in Years 2, 3 and 4 to cover the honoraria of the invited trainers who will conduct the annual field courses. Total of $60,000 in FX.

h) Research

Grants (U.S.): Assume 16 one-year grants to U.S. based students for the LOP (e.g. M.S. Ph. D. level). Grants are budgeted at $15,000/grant which covers a stipend, travel to/from Bolivia, field travel and expenses, etc. Total cost $240,000 in FX.

Grants (Bolivian): We are budgeting 63 one-year research grants for Bolivian students at $8,000/grant which covers a stipend, field travel, field expenses, etc (e.g. B. S. level). Total of $504,000 in L/C.

Contract research: Budgeting 10 research studies for the LOP at $5,000/study in Years 2, 3, and 4. Total of $50,000 in FX.

Product studies: We are budgeting $25,000/yr in Years 1-6 to carry out product studies. Total of $150,000 in LC.

Research assistants: We are budgeting for 2 research assistants to work on natural forest management during Years 1-7 at $3,000/yr each. Total of $36,000 in LC.

Bosques Chimanes: We are budgeting a total of $156,630 in FX over the LOP to conduct: 1) assessment of impact of mahogany harvesting on biodiversity, 2) ecology and management of lesser known species, 3) development of a remote sensing forest classification system. This research will be conducted in Years 1 and 2.

i) Other Technical Expenses

We are budgeting a total of $14,000 over the LOP for the purchase of technical publications.

j) Inflation

Just as it was applied in the previous components, an inflation factor of 4% was applied in Years 2 and 3. For Years 4 through 7, the applied inflation factor was 5%. Inflation is not compounded.

k) Contingency

We are budgeting a 5% contingency rate on total local currency costs.

4. PRODUCT DEVELOPMENT

a) Staff

For LOE distribution see LOE chart.

1) TA

LT, Product Marketing Specialist (Expatriate): Base salary = $60,000/yr x 2.36 = $141,600.

LT, Timber Specialist (Local): Base salary = $24,000/yr x 2.36 = $56,640.

LT, Non-Timber Specialist (Local Professional): Base Salary = $24,000/yr x 2.36 = $56,640.

ST (Expatriate): LOE under Expatriate ST TA covers LOE for timber, non-timber, and enterprise development specialties. Average Daily Rate used = $260/day x 260 days (or $67,600/yr) x 2.36.

ST (Local): Average daily rate = $100/day x 260 days or 26,000/yr x 1.90.

2) Support

None has been budgeted for this component. Support staff is provided under the Management/Administration component.

3) Counterpart

To be determined.

b) Travel & Per Diem

1) Long-term Expatriate

- International Travel & Per Diem:

• To/From Post for LT Expat: We are assuming to and from post travel for each LT Expatriate advisor, his/her spouse and 2 dependents. Budgeted one-way ticket to Bolivia at $1,100. In addition, we are budgeting one day of per diem for each Expatriate LTer and each of his/her dependents at the average rate of $90.

• International Conference/Fair: Budgeted for every other year for each LT expatriate advisor. Average length of stay of 14 days each trip. Average round trip fare is $1,600, and average daily per diem rate for D.C. or Europe is $148.

• Rest and Recuperation Travel (R&R): R&R travel calculations are based on a round-trip fare from La Paz to Panama at $700, which we understand to be Bolivia's R&R point. We are budgeting R&R travel for the Product Marketing Specialist and dependents in Years 3 and 4.

• Home Leave Travel: None budgeted.

- In-country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes each Expatriate LTer will make 6 in-country trips per year. (If LOE in one year for LTer is only 3 months, then only 3 in-country trips would be made). Each in-country trip would be 5 days duration at the average per diem rate of $90. Average in-country round trip fare used for Santa Cruz - La Paz is $150.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 3 days a month (36 days a year) for each Expatriate LTer to visit the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the

project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

2) Long-term Local

- International Travel & Per Diem:

Assumes no international trips for Local LTers.

- In-Country Travel & Per Diem:

Assumes 6 in-country trips per year for each Local LTer. Estimate 3 days per trip at average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted).

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 3 days a month (36 days a year) for each Local LTer to visit the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

3) Short-term Expatriate

- International Travel & Per Diem:

Assumes 1 international trip per Person Month of LOE. Estimate each trip to be of 30 days in duration, 25 of which will be spent in either Santa Cruz or La Paz and 5 of which will be spent in the field visiting project pilot sites. Per diem while in Bolivia has been budgeted at the average rate between Santa Cruz and La Paz of $90.

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- In-Country Travel & Per Diem:

Assumes 1 in-country trip per Person Month of ST Expatriate LOE. Have budgeted fare at $150/round-trip. As mentioned above, ST Expatriates will receive the average per diem rate of $90 during the 25 days spent in Santa Cruz or La Paz.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Expatriate LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

4) Short-term Local

- International Travel & Per Diem:

No international trips for Local STers.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 1 trip for every Person Month of ST Local LOE, with 5 days duration at the average per diem rate of $103/day. Have budgeted round trip at $150.

- Field (project pilot sites) Travel & Per Diem:

Have budgeted 5 days per Person Month of ST Local LOE to be spent visiting the project pilot sites at a per diem rate of $20/day. Project staff will use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation during in-country travel in Santa Cruz or La Paz.

5) Counterpart Staff

- International Travel & Per Diem:

No international trips for Counterpart Staff.

- In-Country (Santa Cruz/La Paz) Travel & Per Diem:

Assumes 4 in-country trips per year for each Counterpart Staff. Estimate 3 days per trip at average per diem rate of $90/day. Round trip fare between Santa Cruz and La Paz is budgeted at $150. (If assignment in a year is 6 PMs, then only 3 in-country trips have been budgeted). Under the Product Development component, no in-country trips have been budgeted at this time.

- Field (project pilot sites) Travel & Per Diem:

Again, under the Product Development component, no field trips have been budgeted at this time. Otherwise, it would assume 3 days per month (36 days per year) to be spent by each Counterpart Staff visiting the project pilot sites at a per diem rate of $20/day. Counterpart Staff would use the airplane rented by the project for these trips to the field. The cost of airplane rental is budgeted in line item 1.3 (Airplane) of the Management/Administration component.

- Local Transport:

Estimated at $10/day to cover taxis and other local transportation when traveling in Santa Cruz or La Paz. Not applicable in this category at this time.

6) Support Staff

No travel funds have been budgeted for Support Staff.

c) Allowances

Post Differential has been calculated at 15% (according to Standard Regs rates for Santa Cruz). We are calculating post differential on 90% of salary so as not to count the times the LT Expat advisors are away from post (international travel, R&R). If the LTer's first year in the field starts with 6 months, then post differential has been budgeted for half only.

Living Quarter Allowances (LQA) has been calculated at $18,000/year per LTer family. If the LTer's first year in the field starts with 6 months, then LQA has been budgeted for half only.

Education Allowance has been calculated at the full $3,350 per dependent per year, which is the maximum Standard Regs rate for this allowance, even when a LTer's tour of duty begins or ends with only 6 months of the year.

Moving Expenses: Budgeted at $12,850 per LTer to cover shipping and relocation expenses to post (includes ocean freight, air freight, and excess baggage expenses). Same amount has been budgeted in the year that ends the LTer's tour of duty.

POV (Personally Owned Vehicle): The cost of shipping a vehicle to Bolivia is included for the product marketing specialist. The rate of $3,000 is based on the current cost of shipping an average-sized vehicle to Bolivia, one way only.

Storage: Budgeted at $40/month. Included a $500 pack-in and pack-out fee.

d) Operations Costs

- Product Development/Marketing Tours: In Years 2-6 we have budgeted two marketing tours per year. Five persons will attend each tour, with the cost per person estimated at $2,000. The total cost for each tour is 5 X 2 X $2,000 = $10,000. Total of $100,000 in FX.

- DBA: DBA insurance is costed at the current rate of 2.79 percent of total remuneration for expatriate professional staff (salary + post differential).

- MEDEX: MEDEX is standard medical evacuation insurance that covers evacuation costs when required. Budgeted at the current rate of $170/yr for each LT expatriate and at $17/month for ST expatriates.

- Passports and Visas: An estimate of $50/international trip is included to cover the cost of passports and visas.

- Airport Tax: An estimate of $20/international trip is budgeted to cover the cost of airport departure tax.

- Medical Exams: In accordance with the revised guidelines of AID Handbook 14 (February 1991) regarding the reimbursement of medical examinations for contractor personnel, we are budgeting $300/individual for long-term expatriate team members and their dependents. For Short-term expatriate professionals the AID maximum of $100 per medical exam is budgeted. In addition we are budgeting $100 for pre-employment medical exams used per local professional staff member.

- Inoculations: Inoculations are budgeted at $30 for each international trip.

e) **Commodities**

None has been budgeted for this component.

f) **Training**

Workshops/Seminars/Conferences: We are budgeting $2,000/yr in foreign exchange and $2,000/yr in local currency to cover the expenses of hotel or classroom rental for workshops, seminars or conferences. These events will be 1-5 days long with 15-20 people to participate in each event.

g) **Research**

Product Studies: We are budgeting $20,000/yr (2 studies) in FX in Years 3, 4 and 5 and $25,000/yr in LC in Years 1-6 to carry out product studies. Total of $60,000 in FX and $150,000 in LC.

Research Assistant: We are budgeting 1 research assistant during Years 1 - 6 at $3,000/yr. Total of $18,000 in LC.

h) **Other Technical Expenses**

None has been budgeted for this component.

i) **Inflation**

Just as it was applied in the previous components, an inflation factor of 4% was applied in Years 2 and 3. For Years 4 through 7, the applied inflation factor was 5%. The inflation rate is not compounded.

j) **Contingency**

We are budgeting a 5% contingency rate on total local currency costs.

5. USAID/BOLIVIA

a) **Evaluations**

- Midterm Evaluations (2): Budgeted at a total of $60,000 in FX and $5,000 in L/C for 2 midterm evaluations

- Final Evaluation: Estimated at $55,000 in FX and $5,000 in LC.
- Independent Evaluations: Budgeted at a total of $80,000 in FX and $5,000 in LC.

b) Audits

- Project Audits: Budgeted at a total of $50,000 in FX.
- Recipient Audits to MDSMA/FONAMA (7): Budgeted at a total of $60,000 in FX.

c) Project Support

- Project Assistant: We are budgeting $250,000 in FX over the LOP to cover salary and fringe benefits, $20,000 in LC for travel and per diem expenses, $10,000 in FX for office equipment, and $5,000 in FX for operational costs.
- Project Manager: Estimate $50,000 in LC to cover travel and per diem expenses.

d) Commodities

- Household effects (4 sets): We are budgeting a total of $80,000 in FX and $10,000 in LC for the purchase and shipment of 4 sets of household effects for the team's long-term expatriate advisors.
- Vehicles (6): We are budgeting $150,000 in FX for the purchase of 6 project vehicles.

e) Training

- Long-term: Budgeted at a total of $90,000 in FX over the life of the project.
- Short-term: Budgeted at a total of $50,000 in FX over the life of the project.

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)
BUDGET SUMMARY BY CATEGORY & CURRENCY REQUIREMENT

23-Aug-93 05.30 PM

	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
1. MANAGEMENT/ADMINISTRATION	1,139,230	461,820	1,226,904	344,760	1,033,565	392,720	833,233	385,960	779,385	303,960	728,707	296,260	449,664	357,272	6,192,688	2,542,772
1.1 La Paz/MDSMA																
Staff	0	50,400	0	88,400	0	86,400	0	86,400	0	86,400	0	86,400	0	86,400	0	568,800
Operations Costs	0	11,600	0	16,500	0	17,000	0	17,000	0	17,000	0	17,000	0	6,792	0	102,892
Travel & Per Diem	0	11,100	0	9,300	0	9,300	0	9,300	0	9,300	0	9,300	0	9,300	0	66,900
Commodities & Freight	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaluations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Audits	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grants to NGOs	0	50,000	0	50,000	0	50,000	0	50,000	0	50,000	0	50,000	0	45,000	0	345,000
Certification Unit	0	0	0	0	0	30,000	0	27,000	0	0	0	0	0	0	0	57,000
Contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	57,030	0	57,030
1.2 Contractor																
1.2.1 Home Offices (Consortium)																
Staff	155,700	0	145,857	0	93,269	0	53,926	0	36,915	0	36,915	0	29,107	0	551,689	0
Operations Costs	19,300	0	20,966	0	20,966	0	20,075	0	19,657	0	19,657	0	18,922	0	139,543	0
Travel & Per Deim	27,750	0	21,600	0	21,600	0	12,300	0	9,300	0	9,300	0	9,300	0	111,150	0
Inflation	0	0	7,537	0	5,433	0	4,315	0	3,294	0	3,294	0	2,868	0	26,739	0
1.2.2 Santa Cruz / TA Contractor																
Staff																
Technical Assistance	378,308	0	494,613	0	378,229	0	274,940	0	267,860	0	246,620	0	123,310	0	2,164,080	0
Support	116,270	0	150,990	0	150,990	0	150,990	0	150,990	0	150,990	0	75,495	0	946,715	0
Counterpart	0	21,600	0	43,200	0	43,200	0	43,200	0	43,200	0	43,200	0	43,200	0	280,800
Operations Costs	104,017	21,600	179,564	21,600	178,034	21,600	176,209	21,600	176,209	21,600	149,309	14,400	111,110	14,400	1,074,452	136,800
Travel & Per Diem	46,780	2,520	50,158	5,040	37,102	5,040	20,012	5,040	16,237	5,040	16,112	5,040	14,052	5,040	200,453	32,760
Allowances	54,505	0	36,858	0	38,608	0	36,858	0	36,858	0	36,858	0	35,129	0	275,674	0
Commodities & Freight	234,600	27,000	40,250	7,500	34,500	2,500	23,000	2,500	23,000	2,500	23,000	2,000	11,500	0	389,850	44,000
Training	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
Research & Studies	0	0	40,000	75,000	40,000	75,000	25,000	85,000	5,000	10,000	5,000	10,000	0	0	115,000	235,000
Other Technical Expenses	0	14,000	0	28,240	0	50,680	0	56,920	0	56,920	0	56,920	0	35,960	0	299,640
Inflation	0	0	38,311	0	32,834	0	33,608	0	32,065	0	29,652	0	16,873	0	183,343	0
Contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	52,150	0	52,150
1.3 FAN Headquarters Support	0	250,000	0	0	0	0	0	0	0	0	0	0	0	0	0	250,000
2. POLICY / INST. ANALYSIS	170,983	31,520	251,426	66,040	314,409	66,040	283,077	66,040	243,296	58,040	108,165	58,040	18,273	75,078	1,389,629	420,798
Staff																
Technical Assistance	126,940	0	161,764	0	206,054	0	180,409	0	162,997	0	87,346	0	14,180	0	939,670	0
Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Counterpart	0	24,000	0	48,000	0	48,000	0	48,000	0	48,000	0	48,000	0	48,000	0	312,000
Travel & Per Diem	38,550	2,520	48,750	5,040	49,920	5,040	43,320	5,040	38,220	5,040	12,420	5,040	743	5,040	231,923	32,760
Allowances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operations Costs	2,993	0	3,742	0	3,842	0	3,368	0	2,993	0	748	0	0	0	17,686	0
Commodities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Training	2,000	2,000	27,000	2,000	27,000	2,000	27,000	2,000	27,000	2,000	2,000	2,000	2,000	2,000	114,000	14,000
Research & Studies	0	3,000	0	11,000	15,000	11,000	15,000	11,000	0	3,000	0	3,000	0	0	30,000	42,000
Other Technical Expenses	500	0	500	0	500	0	500	0	500	0	500	0	500	0	3,500	0
Inflation	0	0	9,670	0	12,093	0	13,480	0	11,586	0	5,151	0	670	0	52,850	0
Contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	20,038	0	20,038

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)
BUDGET SUMMARY BY CATEGORY & CURRENCY REQUIREMENT

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	YR 1		YR 2		YR 3		YR 4		YR 5		YR 6		YR 7		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
3. NATURAL FOREST MGMT	664,559	165,200	967,675	326,900	1,105,488	344,400	824,955	324,400	467,587	263,400	249,797	219,900	118,717	154,130	4,398,778	1,800,330
Staff																
Technical Assistance	268,594	0	514,060	0	573,298	0	373,561	0	212,190	0	160,244	0	62,855	0	2,164,800	0
Support	5,960	0	10,960	0	10,960	0	10,960	0	10,960	0	10,960	0	5,960	0	66,720	0
Counterpart	0	25,200	0	50,400	0	50,400	0	50,400	0	50,400	0	50,400	0	50,400	0	327,600
Travel & Per Diem	54,457	4,500	69,972	9,000	64,722	9,000	60,157	9,000	34,200	9,000	22,800	9,000	8,250	9,000	314,558	58,500
Allowances	58,793	0	35,110	0	35,110	0	35,718	0	0	0	0	0	0	0	164,731	0
Operations Costs	8,675	0	18,430	0	17,507	0	4,978	0	1,671	0	1,123	0	374	0	52,958	0
Facilities	0	62,500	0	62,500	0	62,500	0	62,500	0	0	0	0	0	0	0	250,000
Commodities	136,850	40,000	25,875	28,500	24,725	28,500	23,000	16,000	16,100	15,000	9,775	12,000	8,625	7,000	244,950	145,000
Training	2,000	2,000	151,000	51,500	255,000	81,000	201,000	51,500	108,000	54,000	31,000	21,500	27,000	2,000	775,000	243,500
Research	128,230	31,000	103,400	127,000	80,000	135,000	75,000	135,000	60,000	135,000	0	127,000	0	0	446,630	690,000
Other Technical Expenses	1,000	0	3,000	0	3,000	0	3,000	0	2,000	0	2,000	0	0	0	14,000	0
Inflation	0	0	35,868	0	41,188	0	37,583	0	22,268	0	11,895	0	5,653	0	154,433	0
Contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	85,730	0	85,730
4. PRODUCT DEVELOPMENT	38,037	30,000	443,224	30,000	530,511	30,000	540,090	30,000	280,155	30,000	173,258	30,000	33,632	11,100	2,038,905	191,100
Staff																
Technical Assistance	26,569	0	299,536	0	377,704	0	364,410	0	192,103	0	130,692	0	28,320	0	1,419,354	0
Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Counterpart	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Travel & Per Diem	8,700	0	48,422	0	52,060	0	56,142	0	30,840	0	11,940	0	1,710	0	209,814	0
Allowances	0	0	49,630	0	33,280	0	46,630	0	0	0	0	0	0	0	129,540	0
Operations Costs	748	0	26,569	0	25,063	0	25,189	0	21,871	0	20,374	0	0	0	119,834	0
Commodities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Training	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
Research	0	28,000	0	28,000	20,000	28,000	20,000	28,000	20,000	28,000	0	28,000	0	0	60,000	168,000
Other Technical Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inflation	0	0	17,047	0	20,404	0	25,719	0	13,341	0	8,250	0	1,602	0	86,363	0
Contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	9,100	0	9,100
5. USAID / Bolivia	297,500	12,850	162,500	4,450	108,500	5,350	103,500	4,500	103,000	5,350	102,500	4,650	102,500	7,850	980,000	45,000
Evaluations	0	0	25,000	1,600	30,000	2,500	25,000	1,600	30,000	2,500	30,000	1,600	55,000	5,000	195,000	15,000
Audits	0	0	60,000	0	0	0	0	0	0	0	0	0	0	0	60,000	0
Project Support	42,500	2,850	52,500	2,850	48,500	2,850	48,500	2,900	48,000	2,850	47,500	2,850	27,500	2,850	315,000	20,000
Commodities	230,000	10,000	0	0	0	0	0	0	0	0	0	0	0	0	230,000	10,000
Training	25,000	0	25,000	0	30,000	0	30,000	0	25,000	0	25,000	0	20,000	0	180,000	0
TOTAL	2,310,309	701,390	3,053,729	774,170	3,092,473	838,510	2,584,855	810,900	1,873,423	660,750	1,362,425	608,850	722,786	605,430	15,000,000	5,000,000
TOTAL (FX + LC)		3,011,699		3,827,899		3,930,963		3,395,755		2,534,173		1,971,275		1,328,216		20,000,000

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
1. MANAGEMENT/ADMINISTRATION	1,139,230	461,820	1,228,904	344,780	1,033,565	392,720	833,233	385,960	779,385	303,960	726,707	296,260	449,664	357,272	6,192,688	2,542,772
1.1 La Paz/MDSMA	0	123,100	0	162,200	0	192,700	0	169,700	0	162,700	0	162,700	0	204,522	0	1,197,622
a) Staff	0	50,400	0	86,400	0	86,400	0	86,400	0	86,400	0	86,400	0	86,400	0	568,800
Coordinator		28,800		28,800		28,800		28,800		28,800		28,800		28,800	0	201,600
Project Officer (La Paz)		0		14,400		14,400		14,400		14,400		14,400		14,400	0	86,400
Accountant		14,400		14,400		14,400		14,400		14,400		14,400		14,400	0	100,800
Secretary		7,200		7,200		7,200		7,200		7,200		7,200		7,200	0	50,400
Field Representative (Santa Cruz)		0		21,600		21,600		21,600		21,600		21,600		21,600	0	129,600
b) Operations Costs	0	11,600	0	16,500	0	17,000	0	17,000	0	17,000	0	17,000	0	6,792	0	102,892
Equipment Maintenance		300		400		400		400		400		400		300	0	2,800
Office Supplies		1,500		2,000		2,500		2,500		2,500		2,500		2,000	0	15,500
Phone/Fax/Telex		1,200		1,500		1,500		1,500		1,500		1,500		1,000	0	9,700
Postage & Misc.		500		800		800		800		800		800		500	0	5,000
Reproduction Cost		800		800		800		800		800		800		492	0	5,092
Publishing / Printing / Editing		2,500		6,000		6,000		6,000		6,000		6,000		2,500	0	35,000
Planning Workshop		5,000		5,000		5,000		5,000		5,000		5,000		0	0	30,000
c) Travel & Per Diem	0	11,100	0	9,300	0	9,300	0	9,300	0	9,300	0	9,300	0	9,300	0	66,900
International & In-country Travel		3,300		2,700		2,700		2,700		2,700		2,700		2,700	0	19,500
International, In-country & Field Per Diem		7,140		6,060		6,060		6,060		6,060		6,060		6,060	0	43,500
Local Transport		660		540		540		540		540		540		540	0	3,900
d) Commodities & Freight	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
e) Evaluation		0		0		0		0		0		0		0	0	0
f) Audits		0		0		0		0		0		0		0	0	0
g) Grants to NGOs		50,000		50,000		50,000		50,000		50,000		50,000		45,000	0	345,000
h) Certification Unit						30,000		27,000							0	57,000
i) Contingency (5% on total local currency)														57,030		57,030
1.2 Contractor	1,139,230	88,720	1,228,904	182,580	1,033,565	200,020	833,233	196,260	779,385	141,260	726,707	133,560	449,664	152,750	6,192,688	1,095,150
1.2.1 Home Offices (Consortium)	202,750	0	195,960	0	141,268	0	90,616	0	69,166	0	69,186	0	60,195	0	829,121	0
a) Staff	155,700	0	145,857	0	93,269	0	53,926	0	36,915	0	36,915	0	29,107	0	551,689	0
Consortium HO Administrative Support																
Project Supervisors	51,035		51,035		51,035		42,529		25,518		25,518		17,012		263,682	0
Project Administrators	20,650		20,650		20,650		6,850		6,850		6,850		5,900		94,400	0
Field Accountant	7,296		0		0		0		0		0		3,648		10,944	0
Logistics	5,094		2,547		2,547		2,547		2,547		2,547		2,547		20,375	0
Consortium HO Technical Support																
Procurement Specialist	15,851		15,851		0		0		0		0		0		31,702	0
Procurement Agent	10,187		10,187		0		0		0		0		0		20,374	0
Communications Specialist	2,812		2,812		0		0		0		0		0		5,624	0
Management Info Systems Specialist	4,700		4,700		0		0		0		0		0		9,400	0
Participant Training	38,075		38,075		19,037		0		0		0		0		95,187	0

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
b) Operations Costs	19,300	0	20,966	0	20,966	0	20,075	0	19,657	0	19,657	0	16,922	0	139,543	0
Phone/Fax/Telex	5,000		6,500		6,500		6,500		6,500		6,500		6,500		44,000	0
Office Supplies	4,000		4,500		4,500		4,500		4,500		4,500		4,000		30,500	0
Postage & Misc.	2,000		2,000		2,000		2,000		2,000		2,000		2,000		14,000	0
Reproduction Cost	4,000		4,000		4,000		4,000		4,000		4,000		4,000		28,000	0
Printing and Transl.	1,500		1,600		1,600		1,600		1,600		1,600		1,500		11,000	0
DBA	847		847		847		607		406		406		271		4,231	0
MEDEX	153		119		119		68		51		51		51		612	0
Pasports and Visas	450		350		350		200		150		150		150		1,600	0
Airport Tax	180		140		140		80		60		60		60		720	0
Medical Exams	900		700		700		400		300		300		300		3,600	0
Inoculations	270		210		210		120		90		90		90		1,080	0
c) Travel & Per Diem	27,750	0	21,600	0	21,600	0	12,300	0	9,300	0	9,300	0	9,300	0	111,150	0
International & In-country Travel	15,150		11,600		11,600		6,700		5,100		5,100		5,100		60,750	0
International, In-country & Field Per Diem	11,340		8,820		8,820		5,040		3,780		3,780		3,780		45,360	0
Local Transport	1,260		980		980		560		420		420		420		5,040	0
d) Inflation (4% Yrs 2-3, 5% Yrs 4-7)			7,537	0	5,433	0	4,315	0	3,294	0	3,294	0	2,866	0	26,739	0
1.2.2 Santa Cruz/TA Contractor	936,460	88,720	1,032,944	182,580	892,297	200,020	742,617	196,260	710,219	141,260	650,541	133,560	389,469	152,750	5,363,567	1,095,150
a) Staff	494,578	21,600	645,803	43,200	529,219	43,200	425,930	43,200	418,650	43,200	397,610	43,200	198,805	43,200	3,110,795	280,800
1) TA																
Chief of Party	204,140		204,140		204,140		204,140		204,140		204,140		102,070		1,326,910	0
LT, M&E/MIS (Expatriate/Residing in Bolivia)	78,700		153,400		78,700		0		0		0		0		306,600	0
LT, Information Specialist (Local)	10,620		42,480		42,480		42,480		42,480		42,480		21,240		244,260	0
LT, Logistics Coordinator (Local)	7,080		28,320		28,320		28,320		21,240		0		0		113,280	0
ST, Various (Expatriate)	79,768		66,473		28,589		0		0		0		0		172,830	0
ST, (Local)	0		0		0		0		0		0		0		0	0
2) Support																
Office Mananger/Administration	42,000		42,000		42,000		42,000		42,000		42,000		21,000		273,000	0
Accountant/Bookkeeper	16,800		16,800		16,800		16,800		16,800		16,800		8,400		109,200	0
Database Assistants (2)	16,800		33,600		33,600		33,600		33,600		33,600		16,800		201,600	0
Secretary, Sr	11,200		11,200		11,200		11,200		11,200		11,200		5,600		72,800	0
Secretaries Jr (3)	14,000		21,000		21,000		21,000		21,000		21,000		10,500		129,500	0
Drivers (3)	10,920		21,840		21,840		21,840		21,840		21,840		10,920		131,040	0
Messenger	4,550		4,550		4,550		4,550		4,550		4,550		2,275		29,575	0
3) Counterpart																
MDSMA M&E Specialist (Santa Cruz)		10,800		21,600		21,600		21,600		21,600		21,600		21,600	0	140,400
MDSMA M&E Specialist (La Paz)		10,800		21,600		21,600		21,600		21,600		21,600		21,600	0	140,400
b) Operations Costs	104,017	21,600	179,564	21,600	178,034	21,600	176,209	21,600	176,209	21,600	149,309	14,400	111,110	14,400	1,074,452	136,800
Office Rental		21,600		21,600		21,600		21,600		21,600		14,400		14,400	0	136,800
Utilities	3,600		3,600		3,600		3,600		3,600		3,600		3,600		25,200	0
Phone line	3,750														3,750	0
Equipment Maintenance	1,000		2,000		2,500		2,500		2,500		2,500		2,500		15,500	0
Fuel and Vehicle Maintenance	20,000		39,000		39,000		39,000		39,000		39,000		39,000		254,000	0
Airplane rental	26,400		52,800		52,800		52,800		52,800		26,400		26,400		290,400	0
Expendable Supplies	4,000		4,200		4,200		4,200		4,200		4,200		4,000		29,000	0
Communications (Phone/Fax/Telex/Postage)	22,000		52,800		52,800		52,800		52,800		52,800		20,000		306,000	0
Printing and Translation	1,600		3,600		3,600		3,600		3,600		3,600		3,370		22,970	0
Reproduction Cost	8,500		10,500		10,500		10,500		10,500		10,500		6,500		67,500	0
Legal Costs	600		600		600		600		600		600		600		4,200	0

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
Bank Charges	300		300		300		300		300		300		300		2,100	0
Guard Services	1,800		1,800		1,800		1,800		1,800		1,800		1,800		12,600	0
Conference/Fair Registration Expenses	1,000		1,500		1,500		1,500		1,500		1,000		1,000		9,000	0
DBA																
LT Expat	3,682		4,553		3,646		2,739		2,739		2,739		1,370		21,468	0
ST Epat	943		786		314		0		0		0		0		2,043	0
MEDEX																
LT Expat + Dependants	340		340		340		170		170		170		170		1,700	0
ST Epat	102		85		34		0		0		0		0		221	0
Passports & Visas	550		300		150		50		50		50		250		1,400	0
Airport Tax	220		120		60		20		20		20		100		560	0
Medical Exams																
LT Expat + Dependants	2,400														2,400	0
ST Expat	800		500		200		0		0		0		0		1,300	0
Local Professionals	300														300	0
Inoculations	330		180		90		30		30		30		150		840	0
Miscellaneous supplies	0		0		0		0		0		0		0		0	0
c) Travel & Per Diem	46,780	2,520	50,158	5,040	37,102	5,040	20,012	5,040	16,237	5,040	16,112	5,040	14,052	5,040	200,453	32,760
International & In-country Travel	20,900		20,350		17,250		8,700		5,675		7,800		8,500		89,175	0
International, In-country & Field Per Diem	23,840		27,598		19,542		10,652		9,947		7,832		5,312		103,723	0
Local Transport	2,040		2,210		1,310		660		615		480		240		7,555	0
Counterpart Travel, Per Diem & Transport		2,520		5,040		5,040		5,040		5,040		5,040		5,040	0	32,760
d) Allowances (only for COP, M&E locally hired)	54,505	0	36,858	0	36,608	0	36,858	0	36,858	0	36,858	0	35,129	0	275,674	0
Post Differential	12,975		11,676		11,676		11,676		11,676		11,676		5,839		77,204	0
Living Qtrs Allowance	16,000		16,000		16,000		16,000		16,000		16,000		9,000		117,000	0
Education Allowance	6,700		6,700		6,700		6,700		6,700		6,700		6,700		46,900	0
Moving Expenses	12,850				1,750								12,850		27,450	0
POV	3,000														3,000	0
Storage	980		480		480		480		480		480		740		4,120	0
e) Commodities & Freight	234,600	27,000	40,250	7,500	34,500	2,500	23,000	2,500	23,000	2,500	23,000	2,000	11,500	0	389,850	44,000
Office Furniture	10,000	25,000	5,000	5,000											15,000	30,000
Office Equipment	20,000		10,000		10,000										40,000	0
Computer Equipment	60,000														60,000	0
GPS (1 base station & 2 remote stations)	30,000														30,000	0
Macintosh computer (2), printer (1)	6,000														6,000	0
Mapping Plotter (1)	10,000														10,000	0
TM Landsat Images on Tape	50,000														50,000	0
Databases (4)	16,000		16,000		16,000		16,000		16,000		16,000		8,000		104,000	0
Technical supplies	2,000	2,000	4,000	2,500	4,000	2,500	4,000	2,500	4,000	2,500	4,000	2,000	2,000		24,000	14,000
Freight (15% on above items)	30,600		5,250		4,500		3,000		3,000		3,000		1,500		50,850	0
f) Training	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
University (LT)															0	0
Short courses (U.S./ 3rd country)															0	0
Short courses (In-country)															0	0
Semester program (In-country)															0	0
Workshops/Seminars/Conferences	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
Student Projects															0	0
Field courses															0	0
Honoraria, Invited trainers															0	0

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
g) Research	0	0	40,000	75,000	40,000	75,000	25,000	65,000	5,000	10,000	5,000	10,000	0	0	115,000	235,000
Grants (U.S.)															0	0
Grants (Bolivian)															0	0
Contract research															0	0
Product studies															0	0
Research assistants															0	0
Forest Classification System			40,000	75,000	40,000	75,000	25,000	65,000	5,000	10,000	5,000	10,000	0	0	115,000	235,000
h) Other Technical Expenses	0	14,000	0	28,240	0	50,680	0	56,920	0	56,920	0	56,920	0	35,960	0	299,640
Newsletter (24 eds @ $4,000)		8,000		16,000		16,000		16,000		16,000		16,000		8,000	0	96,000
Other Publications (15 @ $3,000)				3,000		6,000		9,000		9,000		9,000		9,000	0	45,000
Audio Visual/Editing		0		3,240		22,680		25,920		25,920		25,920		12,960	0	116,640
Misc Services		6,000		6,000		6,000		6,000		6,000		6,000		6,000	0	42,000
i) Inflation (4% Yrs 2-3, 5% Yrs 4-7)			38,311		32,834		33,608		32,065		29,652		16,873		183,343	0
j) Contingency (5% on total local currency)														52,150		52,150
1.3 FAN Headquarters Support		250,000													0	250,000
2. Policy/Institutional Analysis	170,983	31,520	251,426	66,040	314,409	66,040	283,077	66,340	243,296	58,040	108,165	58,040	18,273	75,078	1,389,629	420,798
a) Staff	126,940	24,000	161,764	48,000	206,054	48,000	180,409	48,000	162,997	48,000	87,346	48,000	14,160	48,000	939,670	312,000
1) TA																
LT, Economist (Local)	0		0		56,640		56,640		56,640		56,640		14,160		240,720	0
ST (Expatriate)	106,357		132,947		132,947		119,652		106,357		26,589		0		624,849	0
ST (Local)	20,583		28,817		16,467		4,117		0		4,117		0		74,101	0
2) Counterpart																
MOSMA Policy Specialist		12,000		24,000		24,000		24,000		24,000		24,000		24,000	0	156,000
CDF Policy Specialist		12,000		24,000		24,000		24,000		24,000		24,000		24,000	0	156,000
b) Travel & Per Diem	38,550	2,520	48,750	5,040	49,920	5,040	43,320	5,040	38,220	5,040	12,420	5,040	743	5,040	231,923	32,760
International & In-Country Travel	14,750		18,550		19,000		16,800		14,900		4,100		113		88,213	0
International, In-Country & Field Per Diem	21,550		27,350		28,040		24,040		21,140		7,590		585		130,295	0
Local Transport	2,250		2,850		2,880		2,480		2,180		730		45		13,415	0
Counterpart Travel, Per Diem & Transport		2,520		5,040		5,040		5,040		5,040		5,040		5,040	0	32,760
c) Allowances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d) Operations Costs	2,993	0	3,742	0	3,842	0	3,368	0	2,993	0	748	0	0	0	17,686	0
DBA																
LT Expat	0		0		0		0		0		0		0		0	0
ST Epat	1,257		1,572		1,572		1,415		1,257		314		0		7,387	0
MEDEX																
LT Expat	0		0		0		0		0		0		0		0	0
ST Epat	136		170		170		153		136		34		0		799	0
Passports & Visas	400		500		500		450		400		100		0		2,350	0
Airport Tax	160		200		200		180		160		40		0		940	0
Medical Exams																
LT Expat + Dependents															0	0
ST Expat	800		1,000		1,000		900		800		200		0		4,700	0
LT Local					100										100	0
Inoculations	240		300		300		270		240		60		0		1,410	0

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
e) Commodities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
None budgeted under Policy component															0	0
f) Training	2,000	2,000	27,000	2,000	27,000	2,000	27,000	2,000	27,000	2,000	2,000	2,000	2,000	2,000	114,000	14,000
University (LT) (Total # of Trainees: 2)			25,000		25,000		25,000		25,000						100,000	0
Short courses (U.S. / 3rd country)															0	0
Short courses (In-country)															0	0
Semester program (In-country)															0	0
Workshops/Seminars/Conferences	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
Student Projects															0	0
Faculty exchange															0	0
Honoraria, invited ::ainers															0	0
g) Research	0	3,000	0	11,000	15,000	11,000	15,000	11,000	0	3,000	0	3,000	0	0	30,000	42,000
Grants (U.S.)					15,000		15,000								30,000	0
Grants (Bolivian)				8,000		8,000		8,000							0	24,000
Contract research															0	0
Product studies		3,000		3,000		3,000		3,000		3,000		3,000			0	18,000
Research assistants (1)																
h) Other Technical Expenses	500	0	500	0	500	0	500	0	500	0	500	0	500	0	3,500	0
Technical journals, subscriptions	500		500		500		500		500		500		500		3,500	0
Data Collection Handbook															0	0
Publications charges															0	0
i) Inflation (4% Yr 2-3, 5% Yr 4-7)			9,670		12,093		13,480		11,586		5,151		870		52,850	0
j) Contingency (5% on total local currency)														20,038		20,038
3. Natural Forestry Mgt (NFM)	664,559	165,200	967,675	326,900	1,105,488	344,400	824,955	324,400	487,587	263,400	249,797	219,900	118,717	154,130	4,398,778	1,800,330
a) Staff	274,554	25,200	525,020	50,400	584,256	50,400	354,521	50,400	223,150	50,400	171,204	50,400	68,815	50,400	2,231,520	327,600
1) TA																
LT, Tropical Forester (Expatriate)	123,900		165,200		165,200		41,300		0		0		0		495,600	0
LT, Wildlife/Biodiversity Spec. (Expat/Bolivian Res)	23,600		94,400		94,400		70,800		0		0		0		283,200	0
LT, Forester (Local)	0		0		56,640		56,640		56,640		56,640		28,320		254,880	0
LT, Ecologist (Local)	0		0		0		42,480		42,480		42,480		21,240		148,680	0
LT, Social Scientist (Local)	10,620		42,480		42,480		31,860		0		0		0		127,440	0
LT, Wildlife/Biodiversity Specialist (Local)	0		0		42,480		42,480		42,480		21,240		0		148,680	0
Student Ecologists	0		70,800		70,800		0		0		0		0		141,600	0
Short-Term (Expatriate)	108,357		132,947		93,063		79,768		66,473		39,884		13,295		531,787	0
Short-Term (Local)	4,117		8,233		8,233		8,233		4,117		0		0		32,933	0
2) Support																
Occasional Labour	5,000		10,000		10,000		10,000		10,000		10,000		5,000		60,000	0
Data Processor	960		960		960		960		960		960		960		6,720	0
3) Counterpart																
CDF/Santa Cruz, Forester		10,800		21,600		21,600		21,600		21,600		21,600		21,600	0	0
MDSMA Research Coordinator		7,200		14,400		14,400		14,400		14,400		14,400		14,400	0	140,400
MDSMA Training Coordinator		7,200		14,400		14,400		14,400		14,400		14,400		14,400	0	93,600
b) Travel & Per Diem	54,457	4,500	69,972	9,000	64,722	9,000	60,157	9,000	34,200	9,000	22,600	9,000	8,250	9,000	0	93,600
International & In-Country Travel	25,675		29,300		25,850		25,475		11,600		7,500		2,650		314,558	58,500
International, In-Country & Field Per Diem	26,387		37,292		35,862		32,107		20,760		14,100		5,170		128,050	0
Local Transport	2,395		3,380		2,990		2,575		1,840		1,200		430		171,698	0
Counterpart Travel, Per Diem & Transport		4,500		9,000		9,000		9,000		9,000		9,000		9,000	14,810	0
															0	58,500

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
c) Allowances (only for Forester)	58,793	0	35,110	0	35,110	0	35,718	0	0	0	0	0	0	0	164,731	0
Post Differential (on 90% of salary)	7,088		9,450		9,450		2,363		0		0		0		28,351	0
Living Quarters Allowance	13,500		18,000		18,000		4,500		0		0		0		54,000	0
Education Allow (2deps @ $3350ea)	5,025		6,700		6,700		1,675		0		0		0		20,100	0
Moving Expenses	25,700						25,700								51,400	0
POV	6,000														6,000	0
Storage	1,480		960		960		1,480		0		0		0		4,880	0
d) Operations Costs	6,675	0	18,430	0	17,507	0	4,976	0	1,871	0	1,123	0	374	0	52,956	0
DBA																
LT Expat	1,942		5,308		5,308		1,391		0		0		0		13,949	0
ST Epat	1,257		1,572		1,100		943		786		472		157		6,287	0
MEDEX																
LT Expat	340		560		680		340		0		0		0		2,040	0
ST Epat	136		170		119		102		85		51		17		680	0
Passports & Visas	850		550		400		750		250		150		50		3,000	0
Airport Tax	340		220		160		300		100		60		20		1,200	0
Medical Exams																
LT Expat + Dependents	2,400														2,400	0
ST Expat	800		1,100		800		800		500		300		100		4,200	0
LT Local	100		100		300		100								600	0
Inoculations	510		330		240		450		150		90		30		1,800	0
Housing Stipend for Student Ecologists			8,400		8,400										16,800	0
e) Facilities	0	62,500	0	62,500	0	62,500	0	62,500	0	0	0	0	0	0	0	250,000
Construction / Renovation		62,500		62,500		62,500		62,500							0	250,000
f) Commodities	136,850	40,000	25,875	28,500	24,725	26,500	23,000	16,000	16,100	15,000	9,775	12,000	8,625	7,000	244,950	145,000
Computer equipment															0	0
Major Equipment	80,000	10,000	10,000	3,000	10,000	3,000	10,000	3,000	5,000	2,000	5,000	2,000	5,000	2,000	125,000	25,000
Equipment/Technical Supplies	34,000	25,000	7,500	22,500	8,500	22,500	5,000	10,000	4,000	10,000	3,500	10,000	2,500	5,000	63,000	105,000
Other	5,000	5,000	5,000	3,000	5,000	1,000	5,000	3,000	5,000	3,000					25,000	15,000
Freight (15% on above items)	17,850		3,375		3,225		3,000		2,100		1,275		1,125		31,950	0
g) Training	2,000	2,000	151,000	51,500	255,000	61,000	201,000	51,500	108,000	54,000	31,000	21,500	27,000	2,000	775,000	243,500
University (LT) (Total # of Trainees: 10)			100,000		200,000		150,000		50,000						500,000	0
Short courses (U.S. / 3rd country) (from impl)			25,000		25,000		25,000		25,000		25,000		25,000		150,000	0
Short courses (In-country)			4,000	9,500	8,000	19,000	4,000	9,500	8,000	19,000	4,000	9,500			28,000	66,500
Semester program (In-country)															0	0
Workshops/Seminars/Conferences	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	25,000	25,000	2,000	2,000	2,000	2,000	37,000	37,000
Student projects				10,000		10,000		10,000		10,000		10,000			0	50,000
Field training				30,000		30,000		30,000							0	90,000
Honoraria, invited trainers			20,000		20,000		20,000								60,000	0
h) Research	128,230	31,000	103,400	127,000	80,000	135,000	75,000	135,000	80,000	135,000	0	127,000	0	0	446,630	690,000
Grants (U.S.)			80,000		80,000		60,000		80,000						240,000	0
Grants (Bolivian)				96,000		104,000		104,000		104,000		96,000			0	504,000
Contract research			15,000		20,000		15,000								50,000	0
Product studies		25,000		25,000		25,000		25,000		25,000		25,000		0	0	150,000
Research assistants (2)		6,000		6,000		6,000		6,000		6,000		6,000		0	0	36,000
Bosques Chimanes																
Mahogany Harvesting	68,365														68,365	0
Others Species	33,550		16,380												49,930	0
Forest Classification System	21,615		12,020												33,635	0
Laptop	4,500														4,500	0

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
f) Other Technical Expenses	1,000	0	3,000	0	3,000	0	3,000	0	2,000	0	2,000	0	0	0	14,000	0
Technical journals, subscriptions															0	0
Data Collection Handbook															0	0
Publication Charges	1,000		3,000		3,000		3,000		2,000		2,000				14,000	0
j) Inflation (4% Yrs 2-3, 5% Yrs 4-7)			35,868		41,168		37,583		22,266		11,895		5,653		154,433	0
Contingency (5% on total local currency)														85,730		85,730
4. Product Development	38,037	30,000	443,224	30,000	530,511	30,000	540,090	30,000	280,155	30,000	173,258	30,000	33,632	11,100	2,038,905	191,100
a) Staff	26,589	0	299,536	0	377,704	0	364,410	0	192,103	0	130,692	0	28,320	0	1,419,354	0
1) TA																
LT. Product Marketing Spec (Expatriate)	0		141,600		141,600		141,600		0		0		0		424,800	0
LT. Timber Specialist (Local)	0		28,320		56,640		56,640		56,640		56,640		14,160		269,040	0
LT. Non-Timber Specialist (Local)	0		28,320		56,640		56,640		56,640		56,640		14,160		269,040	0
ST. (Expatriate)	26,589		93,063		108,357		93,063		66,473		13,295		0		398,840	0
ST. Various (Local)	0		8,233		16,467		16,467		12,350		4,117		0		57,634	0
2) Support Staff															0	0
3) Counterpart																
To be determined		0		0		0		0		0		0		0	0	0
b) Travel & Per Diem	8,700	0	48,422	0	52,060	0	56,142	0	30,840	0	11,940	0	1,710	0	209,814	0
International & In-Country Travel	3,500		20,350		20,100		24,350		11,000		3,700		450		83,450	0
International, In-Country & Field Per Diem	4,700		25,742		29,100		29,182		18,080		7,580		1,170		115,554	0
Local Transport	500		2,330		2,860		2,810		1,760		660		90		10,810	0
Counterpart Travel, Per Diem & Transport		0		0		0		0		0		0		0	0	0
c) Allowances	0	0	49,630	0	33,260	0	46,630	0	0	0	0	0	0	0	129,540	0
Post Differential (@15% of base sal/ on 90% of salary	0		8,100		8,100		8,100		0		0		0		24,300	0
Living Quarters Allowance	0		18,000		18,000		18,000		0		0		0		54,000	0
Education Allow (2deps @ $3350/dep)	0		6,700		6,700		6,700		0		0		0		20,100	0
Moving Expenses			12,850		0		12,850		0		0		0		25,700	0
POV			3,000												3,000	0
Storage	0		980		480		980		0		0		0		2,440	0
d) Operations Costs	745	0	26,589	0	25,063	0	25,189	0	21,871	0	20,374	0	0	0	119,834	0
Product Development / Marketing Tours	0		20,000		20,000		20,000		20,000		20,000		0		100,000	0
DBA																
LT Expat	0		1,900		1,900		1,900		0		0		0		5,700	0
ST Epat	314		1,100		1,257		1,100		786		157		0		4,714	0
MEDEX																
LT Expat	0		170		170		170		0		0		0		510	0
ST Epat	34		119		136		119		85		17		0		510	0
Passports & Visas	100		800		400		600		250		50		0		2,000	0
Airport Tax	40		240		160		240		100		20		0		800	0
Medical Exams																
LT Expat + Dependents			1,200												1,200	0
ST Expat	200		700		800		700		500		100		0		3,000	0
LT Local			200												200	0
Inoculations	60		360		240		360		150		30		0		1,200	0
e) Commodities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
None budgeted under Product Development																

Budget for the Project Paper of the Bolivia Sustainable Forestry Management Project (BOLFOR)

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COMPONENT / CATEGORY	YR 1 FX	YR 1 LC	YR 2 FX	YR 2 LC	YR 3 FX	YR 3 LC	YR 4 FX	YR 4 LC	YR 5 FX	YR 5 LC	YR 6 FX	YR 6 LC	YR 7 FX	YR 7 LC	TOTAL LOP FX	TOTAL LOP LC
f) Training	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
University (LT)															0	0
Short courses (U.S. / 3rd country)															0	0
Short courses (in-country)															0	0
Semester program (in-country)															0	0
Workshops/Seminars/Conferences	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	14,000	14,000
Student projects															0	0
Field training															0	0
Honsorala, visiting trainers															0	0
g) Research	0	28,000	0	28,000	20,000	28,000	20,000	28,000	20,000	28,000	0	28,000	0	0	60,000	168,000
Grants (Foreign)															0	0
Grants (Local)															0	0
Contract research															0	0
Product Studies		25,000		25,000	20,000	25,000	20,000	25,000	20,000	25,000		25,000			60,000	150,000
Research assistant		3,000		3,000		3,000		3,000		3,000		3,000			0	18,000
h) Other Technical Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
i) Inflation (4% Yrs 2-3, 5% Yrs 4-7)			17,047		20,404		25,719		13,341		8,250		1,602		86,363	0
j) Contingency (5% on total local currency)														9,100		9,100
5. USAID/Bolivia	297,500	12,850	162,500	4,450	108,500	5,350	103,500	4,500	103,000	5,350	102,500	4,650	102,500	7,850	980,000	45,000
a) Evaluations																
Mid Term Evaluations (2)					30,000	2,500			30,000	2,500					60,000	5,000
Final Evaluation													55,000	5,000	55,000	5,000
Independent Assessments (Components eval) (3)			25,000	1,600			25,000	1,600			30,000	1,600			80,000	5,000
b) Audits																
Recipient Audits			60,000												60,000	0
b) Project Support																
Project Assistant																
Salary + Fringe benefits	30,000		40,000		40,000		40,000		40,000		40,000		20,000		250,000	0
Travel and Per Diem		2,850		2,850		2,850		2,900		2,850		2,850		2,850	0	20,000
Office Equipment	5,000		5,000												10,000	0
Operational Costs	500		500		1,000		1,000		1,000		500		500		5,000	0
Project Manager																
Travel and Per Diem (2 trips/yr, 3-day)	7,000		7,000		7,500		7,500		7,000		7,000		7,000		50,000	0
c) Commodities																
Household Effects (4)	80,000	10,000													80,000	10,000
Vehicles (6)	150,000														150,000	0
d) Training																
Long-term	15,000		15,000		20,000		20,000		15,000		15,000		10,000		110,000	0
Short-term	10,000		10,000		10,000		10,000		10,000		10,000		10,000		70,000	0
TOTAL	2,310,309	701,390	3,053,729	774,170	3,092,473	838,510	2,584,855	810,900	1,873,423	660,750	1,362,425	606,850	722,788	605,430	15,000,000	5,000,000
GRAND TOTAL (FX + LC)		3,011,699		3,827,899		3,930,983		3,395,755		2,534,173		1,971,275		1,328,216		20,000,000

ANNEX D7
ADMINISTRATIVE

1.0 FUNCTIONS, ROLES AND RESPONSIBILITIES OF IMPLEMENTING ORGANIZATIONS

The institutional and technical analyses led to several important conclusions about prospective implementing agencies, including that:

- No single agency could be responsible for the entire range of activities to be undertaken.

- FONAMA could serve as an effective intermediary agency, bridging both the conservation (protection) interests represented by MDS and the production interests represented by CDF as well as the interests of private concessionaires.

- Considering the possibilities of a new forestry law being passed in the future and its institutional weaknesses, CDF itself should not be the only entity involved in the production activities.

- There are a relatively large number of non-government organizations (NGOs, private enterprises, community groups, universities, the National Forestry Chamber, etc.) that currently work in the forestry and conservation areas and offer valuable experience for implementing the activities contemplated in this project.

- Effective and efficient implementation will require a streamlined approach to management and a structure that has a clear definition of functions, roles, responsibilities and reporting relationships for both Bolivian organizations and the technical assistance contractor.

Since the time of initial project design, however, important new institutional developments have occurred that are related to the project. The new government of Gonzalo Sanchez de Lozada has decided to give greater weight to environmental affairs, and has created a new "super-Ministry" of Sustainable Development and the Environment (MDSMA) to accomplish that objective. This represents a major step forward in Bolivian environmental affairs, and provides an institutional context that should be even more conducive to achievement of project goals and objectives than that under the previous administration. Operationally, the new MDSMA has absorbed the functions of the National Environmental Secretariat (SENMA) and will house the National Environmental Fund (FONAMA); as such, it will be the counterpart agency for the project.

Exhibit D7-1, on the following page, outlines the project structure and the various implementing organizations or agencies. These are divided into primary and secondary

agencies. Primary agencies are those with a direct or first line responsibility for implementation. Secondary agencies will have a second line responsibility (i.e., they might receive a subgrant from a primary agency to carry out a particular set of activities, or they might have an interest in e.g., a policy study, but not be the organization that actually carries out the work).

The following pages describe the functions, roles and responsibilities anticipated for the various implementing agencies.

BOLIVIA FORESTRY MANAGEMENT PROJECT

EXHIBIT D7–1

PRIMARY AND SECONDARY IMPLEMENTATION ROLES

ACTORS:	MGT/ ADM	POLICY/INST ANALYSIS	NFM	Project Structure RES/ TRNG	PROD. DEV.	M&E, INFOR.
FONAMA	P	S			S	
MDS		P		S		P
MACA o CDF o CDF: SCruz		P	S			
Cámara Forestal o National o Santa Cruz		S	S		S	S
Concessionaires		S	S		S	
Enterprises					S	
NGOs o FAN o LIDEMA o Others		S	S	S		S
COMM. GPS.		S	S		S	S
Dev. Corps. o Cordecruz						S
TA Team			P		P	

Notes:
P = Primary implementor
S = Secondary implementor

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PRIMARY IMPLEMENTATION AGENCIES

MDSMA (assisted by FONAMA)

Function: Coordinate administrative and financial aspects of the project, for optimal management.

Role and Responsibilities:

- Overall coordination of project
- Chair advisory committee
- Policy and planning advice (to TA team and GOB)
- Administration of project
  - programmatic
  - fiscal
- Finance: identify/coordinate other donors/sources

MDSMA

Function: Direct the activities involved with conservation and protection of bio-diversity

Role and responsibilities:

- Policy—especially conservation related
- Monitoring, evaluation, information network and communications
- Institutional analysis and development of GOB and NGO capacities in conservation, including e.g. SEDEMAS and CODEMAS
- Management of subgrants in areas of concern, for example to LIDEMA for information dissemination

CDF: National Level

Function: Participate in research, technology transfer, promotion of analyses/studies related to forestry management sector for purposes of improving policy, regulations, norms and technical requirements for sustainable management.

Role and Responsibilities:

- Policy recommendations — especially production related
- Institutional analysis: e.g.
  - Study/analyze CDF restructuring
  - Implement CDF restructuring

CDF: Department Level (Santa Cruz to start)

Function: Participate in analyses/studies related to forestry sector at departmental level for purposes of improving policy, regulations, norms and technical requirements for sustainable management.

Role and Responsibilities:

- Policy analysis and formulation in Department
- Assistance to concessionaires in sustainable production techniques and practices
- Assistance to concessionaires in forest inventories and management plans

SECONDARY IMPLEMENTATION AGENCIES

National Forestry Chamber (CNF)

Function: Serve as primary contact point and provide services to concessionaires and private enterprises

Role and Responsibilities:

- Information on product development
- Enterprise assistance to members
- Support member interests/needs in certification
- Information on project activities
- Policy formulation

Enterprises

Function: Produce and market sustainable forest products

Role and Responsibilities: As beneficiaries, individual enterprises will have the option of participating in and receiving TA, training, product information, etc. from the project.

Concessionaires

Function: Harvest forest products in sustainable manner

Role and Responsibilities: As beneficiaries, the concessionaires will have the option of participating in and receiving TA, training, product information, etc. from the project.

NGOs and Community Groups

Function: Support production and conservation activities

Role and Responsibilities: Note NGOs such as FAN on the conservation side and APCOB for production support to indigenous groups will serve in a variety of ways, through activities funded by subgrants.

- Information on product development
- Enterprise assistance to community businesses
- Organizing community businesses
- Information on certification
- Research
- Monitoring results of EA requirements
- Information on project activities
- Policy formulation

Development Corporations (For example: CORDECRUZ)

Function: Contact point for information on planning, monitoring and evaluation activities.

Role and Responsibilities:

- Source of information on forest resources
- Source of data bases on land use inventories
- Advice on departmental level planning
- Advice on infrastructural investments

TA TEAM

Function: Technical advice, training and direct assistance to enterprises and concessionaires.

Role and Responsibilities: Build capacities of Bolivian governmental agencies, NGOs and private and community enterprises to produce and market forest products and services in sustainable manner.

2.0 ALTERNATIVE ARRANGEMENTS

As stated previously, the design team considered and rejected several alternatives before agreeing on the arrangements described. The basic questions related to (1) housing all activities in one GOB or non-governmental agency; (2) splitting responsibilities among several, but not too many groups; (3) which groups should take the lead; (4) project location (i.e. what activities should take place in La Paz at the national level and what at the departmental level); (5) location of the TA team; (6) a structure and approach that could be extended to sites in other departments in the future; (7) a structure that was broad and sufficiently representative of government and non-government interests; and (8) an approach that considered the Tropical Forestry Action Plan, other donor activities and future interests

so that a framework would be created for others to potentially replicate and provide financing for.

The administrative arrangements selected, albeit not as simple as they could be if housed in a single agency, represent a consensus of the Bolivian and contract members of the design team.

3.0 ADMINISTRATIVE ARRANGEMENTS FOR IMPLEMENTATION

Arrangements for Implementation. The organizational chart at the end of this annex depicts the managerial and administrative arrangements for implementation. This is described further in the body of the PP in the management and implementation plan.

Ability to work together. The functions, roles and responsibilities described above are based on discussions with the respective implementing agencies and their own stated institutional competencies (see attached chart). MDS, FONAMA and CDF agreed to a division of labor for certain activities related to production and conservation/bio-diversity. In effect, these agencies had already agreed to a working understanding among themselves. The project's administrative arrangements for the primary implementing agencies are built around this understanding.

The most recent example of their ability to work together is the World Bank's Global Environmental Facility for a Biodiversity Conservation Project (a system of national parks and protected areas), until recently implemented by SENMA. FONAMA and SENMA worked closely in the design of this project in a manner that led to relatively rapid approval. Another example is the Enterprise for Americas Initiative, coordinated by FONAMA, in which a local administrative council works with FONAMA to review, select and oversee grants to NGOs and community groups for work in the environmental area. Some of these same NGOs will be involved in this project. Also, FONAMA has a working relationship with the PL 480 Secretariat; to date there is a very smooth and systematic working relationship between the parties in the administration of funds for local currency grants. Given that the MDSMA has absorbed both SENMA and FONAMA, as well as almost all their technical staff, these capacities will continue to play important roles in insuring project success.

The working relationships among governmental agencies such as the CDF and CORDECRUZ at the departmental level (i.e. in Santa Cruz) are long established and effective. However, there is no real relationship yet between, for example, the MDSMA and CORDECRUZ or CDF in their Santa Cruz offices. Such relationships will have to be developed over time. and in accordance with the country's new institutional context.

In conclusion, there are some positive previous and current experiences to suggest that the agencies can work together, and some instances where there is no history of working relationships. There is no evidence, however, to suggest that the primary implementing agencies have had a poor history of working together or poor relationships or that they cannot work together on this project.

Attachment: GOB chart of institutional competencies in conservation and biodiversity among the MDSMA, its entity FONAMA, and the CDF.

EXHIBIT D7–2

SUMMARY OF INSTITUTIONAL CAPABILITIES IN SUSTAINABLE FORESTRY MANAGEMENT

MDS Ministry of Sustainable Development/ Ministerio de Desarrollo Sostenible	CDF Forestry Development Center Centro de Desarrollo Forestal	FONAMA National Environmental Fund/ Fondo Nacional para el Medio Ambiente
Supervision, Monitoring, Compliance with Sustainable Forestry Management Norms	Promotion and Control of Sustainable Forest Use, Management and Trade	Financing, Organization of Financing, Donor and Implementor Coordination
POLICY Formulate national environmental policy in conjunction with corresponding agencies in each subsector (forestry, fishery, wildlife).	POLICY Formulate specific policies for the sustainable management of renewable natural resources in accordance with the environmental policies developed by MDS.	POLICY Organize and direct financing based on the environmental policies developed by MDS and the natural resources management policies developed by CDF.
NORM ESTABLISHMENT AND COMPLIANCE Defines the framework within which CDF must carry out the sustainable management of renewable natural resources.	NORM ESTABLISHMENT AND COMPLIANCE Regulates natural resources management according to the framework established by MDS.	NORM ESTABLISHMENT AND COMPLIANCE Provides financial support for the development of conservation and sustainable use norms.
MANAGEMENT Supervises natural resources management. Supervises and monitors the administrative activities of the forestry, fishery and wildlife subsectors.	MANAGEMENT Plans, manages and monitors the marketing and management of renewable natural resources. Enforces the norms established in this sector.	MANAGEMENT Provides financial support for the supervision and development of sustainable natural resources management.
PLANNING Establishes general plans and programs for environmental management in conjunction with the forestry, fishery and wildlife subsectors.	PLANNING Develops and implements sectoral plans and programs in accordance with the environmental plan developed by MDS.	PLANNING Finances the implementation of programs and projects outlined in MDS's plans for environmental management and CDF's sectoral environmental plans. This financing is outlined in the global plans established by the Ministry of Planning (MPC).

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EXHIBIT D7-3

RECOMMENDATIONS ON THE INSTITUTIONAL FRAMEWORK OF MDS, CDF AND FONAMA

MDS Ministry of Sustainable Development/ Ministerio de Desarrollo Sostenible	**CDF** Forestry Development Center/ Centro de Desarrollo Forestal	**FONAMA** National Environmental Fund/ Fondo Nacional para el Medio Ambiente
Establish the internal mechanisms that would enable MDS to effectively assume the roles and responsibilities assigned by Law. Implement its departamental structure (CODEMAS-SEDEMAS).	Create an organizational hierarchy that would be in charge of sustainable natural resources management. This could take the form of a sub-secretariat that would be in charge of all sustainable use issues including the forestry, fishery and wildlife subsectors. Maintain administrative decentralization and decentralization in the control of renewable natural resources. Participation of all sectors of society in renewable natural resources management.	Maintain close coordination with the Ministry of Planning (MPC), MDS and CDF in providing support to renewable natural resources management. Coordinate with and respond to the Ministry of Planning in all matters concerning the organization of investments in the environment. Respond to the policies and plans established in its field of knowledge by MDS and CDF.

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ANNEX E
DRAFT SCOPE OF WORK
INSTITUTIONAL CONTRACT

Attachment 1 : Commodity List
Attachment 2 : Staffing Requirements & Position Descriptions
Attachment 3 : Phasing of Project Activities Chart

ANNEX E
SCOPE OF WORK
INSTITUTIONAL CONTRACT

A. Introduction

This scope of work (SOW) describes the activities to be undertaken by a technical assistance (TA) team under the Bolivia Sustainable Forestry Management (BOLFOR) project. This contract is for a five year period, with options for an additional two years, and will be funded incrementally, subject to the availability of funds to A.I.D. for this purpose, to the mutual agreement of the Parties, at the time, to proceed, and if satisfactory progress has been made. It will provide long and short-term technical assistance, training, project management, procurement and research services to the Government of Bolivia, local NGOs, selected timber and non-timber forest enterprises, and a wide range of forest professionals, technicians, and students.

B. Project Summary

B1. Goal and Purpose

The **goal** of the project is to reduce degradation of forest, soil and water resources and to protect the biological diversity of Bolivia's forests. The **purpose** is to build Bolivian public and private sector capacity to develop and implement programs for sustainable, certifiable forest use.

B2. End of Project Status

Policy and institutional reforms. Significant reforms in Bolivian policies and institutions.

- Suitable forestry law and/or regulations drafted with project technical assistance, and presented to GOB by 1996.
- Forestry Development Center (CDF) in Santa Cruz will have been restructured and will be performing effectively in its forest management and enforcement role.
- Ministry for Sustainable Development and the Environment (MDSMA) has regional capacity in Santa Cruz to carry out its conservation mandate.
- A mechanism is established and is functioning effectively in certifying the sustainable production of timber and non-timber products.

Forest management practices. Sustainable forest use programs being implemented by public and private organizations.

- A substantial body of applied research has been undertaken and published on tropical flora and fauna, ecology, product utilization, economics indigenous peoples technologies, including methodologies for determining sustainability and on acceptable levels of impact.

- Forest management practices will have been tested, evaluated and adopted by commercial foresters and community groups in different ecological settings.

- New markets for those timber and non-timber products which can be produced sustainably will have been developed.

Human resource development. A substantial contribution will have been made to the formation of a cadre of forest professional and technicians working in research, industry and teaching in universities.

C. Implementation Performance Standards

C1. Introduction

Each of the three project components (policy and institutional analysis, natural forest management and product development) and supporting elements (training, research and monitoring/evaluation) is composed of a number of activities. These activities and their outputs are listed in the logical framework of the project paper. Others will be further refined when the implementation team starts its work and detailed implementation plans are worked out with the collaborating and counterpart organizations. Appendix 3 indicates the phasing anticipated for the implementation of the project.

In establishing the implementation performance standards, the central objective or key indicator of each component and the supporting elements has been selected as the key performance indicator. This key indicator in effect represents the sum of the successful completion of the activities listed under the component or supporting element. In most cases, the central objective or key indicator, though qualitative, can be objectively determined and assessed. Lastly, the dynamic nature of the project should be recognized, as well as static measurable results that can be forecast at the outset. In effect, as the project activities unfold and lessons are learned, consideration should be given to modifying, refining and upgrading the indicators in particular at annual review periods and as a result of outside evaluations.

C2. Policy Analysis and Institutional Development

C2a. Forestry Law

BOLFOR itself cannot get a new forestry law and/ or regulations passed by the Bolivian congress, but it can provide a great deal of input to the various Bolivian groups that

will write the new law. Thus, the main standard of performance measurement for this component should be that the TA team, working in conjunction with Bolivian public and private sectors, takes the lead in developing a reasonable and enforceable new draft forestry law and/or regulations.

Delivery of the draft law or regulations to the GOB through the MDSMA, along with the studies listed under the policy analysis and dialogue subcomponent (and the publications thereof), will be the means to verify the outputs and assessing their significance to an improved legal context for sustainable management.

Indicators

1. At least two public seminars held to discuss a new forestry law, bringing together representatives of both public and private sectors (both completed by September 1995).

2. At least three state-of-the-art background papers prepared to inform on the development of the new forestry legislation, e.g. economics, policy, institutional aspects of sustainable forest management (one in 1994, one in 1995 and one in first half of 1996).

3. Draft forest law and/or regulations presented to the GOB through the MDSMA by 1996.

C2b. Sustainable Forestry Certification

BOLFOR should be measured by its contribution to the establishment of an internationally recognized mechanism (e.g. mixed public/private sector organization) capable of certifying the sustainable production of tropical forest products. In addition, it will support forestry producer groups to enable those groups to produce four or more forest products that comply with this group's certification guidelines. This performance standard will measure not only a lasting organizational impact, but also the sum of many activities under the natural forest management and product development components.

Indicators

1. Internationally recognized certification mechanism in place able to service both project-assisted and other forest producer groups (1996).

2. Four or more project-assisted forest products (timber or non-timber) certified through this mechanism (2 in 1997, 2 in 1998).

C2c. Strengthened Institutions

The third major standard of performance under this component is the strengthening of counterpart institutions in sustainable forest management activities, particularly the CDFs (or their replacements) and regional MDSMA offices in areas of major project intervention (e.g. primarily in Bajo Paragua and secondarily Alto Madidi). This will be accomplished largely

by improving the human resource capacity of these organizations through the training of their personnel. These and other institutions should be capable of continuing with BOLFOR initiated activities on their own. Most importantly, the project will help the GOB develop better forestry management plans and be able to monitor and enforce compliance with the plans.

Indicators

1. CDFs (or their replacements) in areas of major primary project intervention have technical capacity necessary to implement research on, advise, and disseminate sustainable forest management plans, as per nationally approved standards. Two plans developed and disseminated by CDF (1998).

2. Regional GOB entities responsible for natural resources management in areas of major project intervention have technical capacity necessary to monitor compliance with sustainable forestry management plans and certification guidelines based on nationally approved standards, with 4 forest concessions effectively monitored (e.g. certification of forest products maintained and/or concessions renewed or canceled based on environmental management) (1998).

Accomplishment of these indicators will be dependent on governmental support.

C2d. Research

The research under this component should result in published forest policy studies. Bolivian scientists should be involved in the preparation of such studies. In addition, assessments of the current status of certain participating institutions may result in plans for their restructuring, as appropriate.

Indicators

1. At least 4 technical articles published in referenced professional journals, with at least 2 of these authored or coauthored by Bolivian scientists (2 by 1996, 2 by 1999).

C2e. Training

The training will include both in-country seminars in forestry legislation and certification issues, as well as masters and doctorate level degrees from U.S. institutions.

Indicators

1. At least 50 persons trained through in-country seminars in forestry legislation and certification issues (including at least half from the private sector) (25 by 1995, 25 by 1998).

2. At least 3 masters degrees received under BOLFOR sponsored research (by 1998).

3. At least 2 masters or PhD degrees received through long-term training.

C3. Natural Forest Management

C3a. Sustainable Forest Management Practices

The major performance standards in this component should be: a) field testing and evaluating (economically as well as ecologically) practices in different ecological settings, and b) establishment and adoption of sustainable, as per nationally approved criteria. Adoption of sustainable forestry practices will be measured by the number of timber and non-timber hectares under production using sustainable practices, and number of owners/concessionaires/enterprises using them. Targets for each year will be reviewed in the annual work plan.

Indicators

1. New forestry practices developed and tested in at least 4 different ecological settings, with their economic and ecological performance compared to existing commercial practices (2 by 1995, 2 by 1997).

2. Two comprehensive project sites established and functioning (one by 1994, one by 1996).

3. Four or more plans for sustainable forest use (including production of timber and/or non-timber forest products) developed, approved and being implemented (2 by 1996, 2 by 1997).

4. 25 percent of all hectares in forest production in Santa Cruz (including area in 4 sustainable products above) certified as sustainable by mechanism outlined in C.2 (by 1999). This assumes that certification of forest products will become a significant factor in world markets, and that GOB legislation requiring sustainable forest management is in place and being enforced by 1996.

5. At least 4 concessionaires and/or community groups using BOLFOR project recommendations (by 1999).

C3b. Research

Development of a substantial body of research on tropical fauna and flora, ecology, product utilization, economics, and on indigenous peoples use of technologies, including standards, criteria and methodologies and systems for determining what is sustainable, what are acceptable levels of impact and how can sustainability be monitored cost effectively.

Indicators

1. At least 8 articles published in professional journals, with at least 4 of these authored or coauthored by Bolivian scientists (2 by 1995, 4 by 1998 and 2 by 1999).

2. State of the art manual on sustainable forest management techniques prepared and disseminated, in both Spanish and English (by 1997)

3. Companion state of the art manual on techniques for assessing impacts of forest products harvesting on biological diversity (flora and fauna) prepared and disseminated, in both Spanish and English. (Note: both 2 and 3 can be combined in one manual).

C3c. Training (Human Resource Development)

Training under this component will focus on developing the human resources base capable of designing and implementing plans for sustainable forest management. Substantial contribution will be made to the formation of a cadre of Bolivian sustainable forest use professionals and technicians (foresters, forest ecologists, natural resource economists, biologists, etc.) capable of undertaking further research in BOLFOR initiated fields, working in the forest industry in applied forestry management practices, or teaching in Bolivian universities.

Indicators

1. Through long-term and other training, a professional cadre of at least 10 Bolivians (MS or PhD levels) capable of designing and implementing plans for sustainable forestry management (including know how to comply with all requirements for product certification), are available to the local forest industry, the GOB and Bolivian universities (5 by 1997 and 5 by 1999).

2. At least one BOLFOR sponsored international conference held in Bolivia on natural forest management, with BOLFOR staff making at least three keynote presentation, and with other AID assisted countries invited to participate (1997).

3. At least 100 persons trained (BS, associate or field personnel level) in specific aspects of sustainable forest management, including low-impact methods of forest product harvesting, techniques for inventories of biological diversity and other relevant topics, in-country seminars (25 by 1995, 50 by 1997 and 25 by 1999).

C4. Product Development

It is understood that BOLFOR will work with forest products only if they can be sustainably cultivated and harvested. Two key implementation performance standards will be applied to this component.

C4a. Timber Products

For timber the key implementation performance standards are green marketing of two species currently being marketed, and value added processing of these existing species (can be the same ones) and, in phase three of the project—years 5-7, green marketing and/or value added processing for two new species.

Indicators

1. Successful marketing of at least two certifiable forest products and/or two value added products from two species currently being marketed, with total dollar volume of sales at least $2 million by 1998.

2. Marketing of two additional certifiable forest products from two additional species, with total dollar volume of sales of at least $.5 million by 1999.

C4b. Non-timber Products

For products in the non-timber category, the key implementation performance standards will be the verification and development of sustainable cultivation and harvesting methods (i.e. meeting certification guidelines), green marketing assistance for at least two major non-timber products and/or value added processing for these products.

Indicators

1. Successful marketing of at least two certifiable forest products and/or two value added products from two species currently being marketed, with total dollar volume of sales at least $.5 million by 1997.

2. Marketing of two additional certifiable forest products from two additional species by 1999.

C4c. Research

Research under this component should result in knowledge of the types of and techniques for sustainable production and marketing of timber and non-timber products. Written reports and project bulletins will be available to substantiate this research.

C4d. Training

Training will increase the human resource base in forest product development through seminars.

Indicators

1. At least 24 persons trained in forest product development in-country seminars, with at least half from the private sector (12 by 1997 and 12 by 1999).

C5. Supporting Elements

C5a. Monitoring and Evaluation

The environmental information, monitoring and evaluation system should by the end of the first year, be equipped to access, record, and retrieve data and other information needed to:

- Monitor environmental change and impact on biodiversity in the areas of project activities
- Plan project activities and record their results
- Track project progress
- Design research and evaluate its results
- Communicate with collaborators, decision makers and the public

Indicators

1. Seven annual global work plans including detailed plans for each project component and supporting activities, prepared and approved.

2. Two semi-annual reports prepared and approved each year, delivered to the USAID project manager on April 1 and October 1 (or otherwise requested by the project manager), and following a format approved by USAID/Bolivia.

3. One major, monograph length end of project report, summarizing BOLFOR's principal activities, successes, and failures, prepared by BOLFOR staff (Bolivian and U.S.) and presented in both Spanish and English, no later than three months prior to the end of contract.

4. In conjunction with support provided by MDS, at least 24 project bulletins (approximately 4 per year over six years) published and disseminated, to national and international audiences.

5. Four USAID briefings given at the request of the project manager.

C5b. Project Management

The contractor should be providing a high level of support to the project throughout its entire life. This should include establishment and staffing of the office in Santa Cruz, recruited and trained local support personnel, procurement of certain commodities, logistical support for field travel, training systems and procedures operational in manner to facilitate

logistical needs of short and long-term trainees, functioning administrative systems, timely and accurate financial reporting on a monthly basis. Each of the three project components should have its own manager who reports to the COP and who coordinates all of the various component elements, including research and training. These managers will be responsible for preparing proposed annual work plans and budgets for their components and presenting these to the COP for revision and approval.

Indicators

1. Santa Cruz offices staffed and partially equipped within three months after arrival of COP.

2. Computer equipment procured for Fonama office in La Paz.

3. Vehicles operational.

4. Procurement of needed commodities on schedule, over the life of project.

5. Three component managers in place, coordinating all of the various component elements, including research and training, and preparing component work plans (one by 1993, one by 1994, one by 1995).

D. Scope of Work

D1. Introduction

Section D describes the contractor's responsibilities for the project's three major components (policy and institutional development, natural forest management, and product development) and its supporting elements (research, training, monitoring and evaluation). The scope also describes the responsibilities for procurement and project management. Appendix 3 describes the phasing plan for implementation.

D2. Policy Analysis and Institutional Development Component

D2a. Introduction

The component will provide research, analytical expertise and support for policy dialogue, ongoing assessments of the capabilities of Bolivian institutions charged with forest management and protection, and advice on institutional reform and restructuring.

The requirements of this component are divided into the policy and institutional subcomponents.

D2b. Requirements

D2b(1). Policy Analysis and Dialogue

This subcomponent will focus on the research, analytical expertise and support for dialogue needed to review and prospectively assist in reformulation of the laws, policies and regulations governing the forestry sector in Bolivia. The subcomponent will also support discussions among the public, private and non-profit sectors of the various issues related to laws, policies, rules and regulations governing forestry and biodiversity, with the aim of establishing a base and consensus for improvements in the regulatory environment and provisions for enforcing the laws.

Analysis and studies. The studies listed below are divided into two categories: 1) issues that relate more or less directly to other project activities and 2) studies needed for the development of laws and regulations for forest management.

The list of studies is not intended to be comprehensive. Nevertheless, the issues encompassed are indicative of the types of questions that need to be addressed in the context of the current debate over natural forest management in Bolivia. Although each study area involves a discrete set of issues, several can be dealt with using the same data. Moreover, much of the information needed to address the key questions will either be generated through activities already planned for other project components or could be generated in conjunction with planned activities at little additional cost.

Cross Cutting Studies

Costs and Returns of Private Sector Management Activities.
Costs and Returns of Government Management Investments.
Opportunity Costs of Sustainable Management.
Monitoring and Evaluation of Project Investments.
The Value of Hunted Game.
Viability of Value-added Processing.
Viability of Community Forestry.
Model Management Plans.

Forest Policy Studies

Logging Profitability.
Timber Pricing Systems.
Concession Tenure Security.
The Future of Forestry in Bolivia.

Policy dialogue. The above mentioned studies are important to the conduct of any dialogue on changes to Bolivian laws and regulations governing the forestry sector. Both during and after the studies, policy dialogue will be carried out through a variety of techniques including discussions with counterparts in the Bolivian public, non-profit and private sectors, workshops and seminars, dissemination of analytical findings, educational programs for the general public, observation of approaches to forestry management in other

countries. The primary counterparts for this work will be MDSMA and CDF; other counterparts will include CNF and various NGOs.

Aside from the normal interaction and advice to counterparts as part of the day to day working requirements, the TA team will be responsible for:

- Providing assistance in drafting legislation and policy.
- Organizing and managing a series of seminars and workshops to discuss findings and implications of studies and to formulate recommendations on changes to Bolivian laws and regulations.
- Disseminating and publishing findings of studies and research.
- Formulating an educational program for the general populace to increase the awareness of deforestation and the need for modifying public attitudes towards conservation of resources.
- Organizing several trips for Bolivian officials to other countries to observe approaches these countries have taken in environmental and forestry management practices and enforcement.

D2b(2). Institutional Analysis and Development

The subcomponent will focus on the institutional analysis and strengthening needs and on building the human resources capacity of Bolivian governmental and nongovernmental organizations involved in the various project elements. Primary emphasis will be placed on the needs of the MDSMA and CDF/Santa Cruz. Emphasis also will be given to the needs of establishing a certification mechanism (e.g. public/private sector council). Finally, assistance will be provided as needed to the MDSMA as it increases the scope and depth of its involvement with project oversight and management.

The project paper summarizes the functions, roles and responsibilities of the implementing entities. However, further work will be needed to better understand the problems and constraints, strengths and weaknesses of the various organizations. Also, recommendations will have to be made and advice given on programs to improve management and administrative systems. Finally, this subcomponent will provide assistance in formulating a strategy and organizational structure/approach to a Bolivian certification program.

Requirements for the chief or party, supported by short-term technical assistance, will include:

Institutional analyses. Further analysis of functions, role, responsibilities, overall mission, strengths, weaknesses, staff training needs, organizational structures, management information and reporting systems.

Institutional strengthening recommendation and plans. Based on analysis, specific recommendations on changes/restructuring needed and program suggestions to improve management and administrative systems and procedures.

Advice and training. Advice and staff training, as may be called for, to implement the recommendations and programs, including e.g. organization and procedure manuals.

Management of subgrants. Advice on standardized systems to review, screen, approve, award and manage subgrants that selected organizations may be called upon to make.

Certification group. Advice on strategy, organizational structure (e.g. public-private council), legal establishment, linkages to foreign certification experts, and plan for implementation.

D3. Natural Forest Management Component

D3a. Introduction

The work of this component will be based on collaboration with commercial forestry concessionaires and community organizations in Santa Cruz Department. The Moira concession of the Bajo Paraguá and the Chiquitano Community Concession in Lomerio were used for planning purposes. A final selection will be made after reviewing other concessions in the vicinity, including some in the Rios Blanco y Negro Wildlife Reserve. Collaborative arrangements will be developed during this early work with CDF-SC, CORDECRUZ, CIAT, CNF, and various NGOs, but no formal official component counterpart arrangements are contemplated before forest management planning has begun. When active promotion of forest management planning begins, the project may well require a closer relationship with CDF/Santa Cruz, CNF, and selected NGOs.

This component supports sustainable logging with full knowledge that any intervention will result in some disruption of ecosystem functions and loss of biological diversity. This component consists of four major subcomponents: forest management planning, research, training and promotion/dissemination.

Forest management planning designs and tests forest management methods and incorporates these into model natural forest management plans suitable for adaptation to commercial forestry. These plans are the synthesis of the silvicultural research.

Research includes ecological research, which is the focus in order to learn how forest management affects and interacts with the environment, as a means to assessing the ecological and economic sustainability of forest practices. It also includes silvicultural and sociological research. The research work of this component will be based on collaboration with commercial forestry concessionaires and community groups in Santa Cruz Department. The approach to research will involve considerable numbers of Bolivian and U.S. students through research fellowships and thus is closely linked to the training subcomponent.

Training encompasses long-term masters and doctoral programs, short-term in-country and third country courses, workshops and seminars, field days and on the job training for students, concessionaires and their employees and community groups. The objective is to increase the human resource capacity of Bolivian public, private and non-profit organizations.

Promotion and dissemination is the process of technology transfer through public relations, training and technical assistance which encourages the widespread adoption of the improved methods and model plans by concessionaires, foresters, and forest workers.

D3b. Requirements

The main requirements of this component are presented below.

Forest Management Planning

The long-term forestry, ecology, social science and wildlife advisors, along with short-term specialists, shall carry out the following requirements:

(1) Direct Advice to Selected Concessionaires and Communities

Initially, the advisors will work directly with one concessionaire and one community group. Several steps are required: negotiation of a working agreement between the parties describing the responsibilities of each, selection of demonstration sites, an inventory of forest resources, and a plan for managing those resources. This will not only assure that the respective outputs will be achieved, but will help to establish a general methodology for broader adoption. Following successful work with at the above two locations in year two, after phase one (see Appendix 3), other concessionaires and communities will be assisted.

(2) Technical Advice

CNF has proposed to establish a technical advisory unit to help their members develop necessary management plans. The advisors will work with CNF to train its staff in forest management planning. TA also will be provided to CDF/Santa Cruz, both to enable CDF technicians to promote natural forest management planning and to develop criteria for judging the adequacy of forest management plans. The MDSMA will receive TA to assist in its extension of responsibilities of conservation and protection at the regional level. TA will also be used for structuring a mechanism (perhaps a council of public, private and non-profit groups) to provide certification services.

(3) Permanent Test Sites

The foundation for much of the forest management research to be conducted will be permanent plots in which the establishment, growth, and commercial product yield of selected species can be monitored. Many of the treatment programs described below will be

conducted initially on these permanent plots. Methods which prove effective on these sites will later be extended to other areas and/or promoted for commercial application.

Study sites will be selected in logged areas, areas to be logged, and control areas. Logging will be carried out in the conventional way or by following felling and extraction guidelines developed by the Project. Intermediate silvicultural treatments will also be tested in the plots.

Baseline inventory data will be collected on pilot sites using various sampling protocols to determine the most cost effective inventory techniques. Techniques will also be developed to monitor the environmental impacts of logging.

(4) Inventory Methods

Planning of sustainable forest management operations cannot proceed rationally until accurate baseline maps are prepared and inventory data collected and plotted. Maps of vegetation types and more detailed maps of stand data for timber and non-timber forest products will be prepared with the aid of existing aerial photographs. Satellite imagery will be used for broad-scale mapping. Selection of stand inventory techniques will be based on preliminary sampling conducted during the phase one of the BOLFOR project. Mapping will be coordinated with organizations such as CORDECRUZ and the work already done by its German advisory team and other organizations such as FAN with a capability to provide aerial photography services.

(5) Natural Forest Management Methods

In phase one of the project, the TA team will design and implement "best guess/high probability" forest management schemes whose elements will be specifically tested and modified if necessary. These will become the models for promotion later in the project. The experience gained will enable the team to design management strategies suitable for different forest types and a variety of commercial timber species.

Initial forest management schemes will be oriented towards low cost techniques to increase growth of desirable species, and to improve logging and extraction methods to avoid damage to remaining trees. However, heavier logging or clear cutting may also be tested as an aid to reproduction of some species with high light requirements. Similarly, other techniques may be tested as a means for reproducing valuable species.

Improved siting of logging trails, vine pruning, directional felling, and cable extraction are well-established as practical methods for reducing damage to the standing forest. In other countries, they have also reduced costs. Trials of these felling and removal methods compared with current Bolivian practices will be used to measure these benefits and economies, and the data used to promote new methods.

3Fc

(6) Species Growth and Reproduction

Growth data will be taken from inventoried plots to determine species yield under various logging treatments. Inventories and observation of reproduction of timber species will expand knowledge of desirable silvicultural practices. This sort of information will be used in modifying practices to optimize forest composition and sustainability.

(7) Assessment of Ecological Sustainability

The TA team will assess the changes which occur in the environmental characteristics of the test area, starting with the initial sites and expanding to other sites through the life of the project. Repeated surveys and environmental site monitoring will be undertaken and related to the interventions practiced, in an attempt to cite causes for the observed effects.

(8) Determination of Cost Effectiveness

Costs and benefits of each practice will be carefully measured and analyzed to determine financial and economic viability feasibility of the recommended practices.

(9) Model Natural Forest Management Plans

The TA team will formulate model forest management plans, based on the observations described above, and including the best combination of practices which result in both economic and ecologic sustainability. Results should become sufficiently clear to warrant specific advice and recommendations on model plans.

Research

The long-term forestry, ecology, social science and wildlife advisors, along with short-term specialists, shall carry out the following requirements:

(1) Ecological, Silvicultural and Wildlife Research

Research program. Identify the key research questions and formulate a research program for the project, with assignment of responsibilities, priorities and resources. Establish a program of competitive research grants, primarily directed at thesis research in line with the needs of the project. Direct students conducting research on behalf of the project. Review research designs and pre-publication review of research results and conclusions.

Baseline inventories and environmental monitoring. Compile a detailed inventory of biological and non-biological characteristics of all project areas and sites, and periodically monitor these characteristics.

Research seminars. Sponsor frequent seminars for staff, grantees, contractors, and public and private technicians to review plans and research in progress.

Dissemination. Disseminate research findings through attendance at international meetings and through submissions in professional journals. Co-author research with Bolivians.

Public relations materials. Draft articles and guide the development of videos for educational purposes to the general public, in collaboration with the Information, Communications, and Monitoring and Evaluation support element.

(2) Social and Cultural Research

Indigenous peoples and rural communities. Develop a program to work with indigenous populations in identifying forest products with market potential and in retrieving and preserving knowledge and technologies of forest use by lowland indigenous populations.

Property rights. In collaboration Indigenous Organizations and interested NGOs, research "intellectual property rights" issues concerning indigenous knowledge of forest products and their uses.

Survey methodology. Develop a survey methodology to determine and monitor the value (nutritional and economic) of forest foods for rural populations, and to generate data for other studies.

Network. Establish a network of rural research collaborators to work in BOLFOR sponsored studies and programs in areas of interest to the project.

Products. Identify ways for local communities to be involved in the ownership and management of income generating activities from forest products.

Training

The long-term forestry, ecology, social science and wildlife advisors, along with short-term specialists, shall carry out the following requirements:

(1) Training for Researchers

A semester diploma course in forest resource management ecology and conservation biology will be organized and offered in coordination with existing Bolivian organizations such as the Ecology Institute. The course is intended to equip researchers with the knowledge and intellectual orientation needed to conduct ecological research in tropical ecology and conservation management. Field training immediately following the semester course in ecological, silvicultural and socioeconomic field methods will provide the practical knowledge needed to conduct research outside the classroom.

(2) Technical Short Courses

Courses for government agents, forest managers, researchers, and professors on emerging issues, environmental research methods. and social science research methods, including gender analysis and participatory research, and natural forest management planning.

(3) Short Courses for Forest Workers

Courses on topics such as reduced impact logging for skidder operators, directional felling for loggers, road drainage for bulldozer drivers, efficient sawmill operations.

(4) Participant Training

A selected group of approximately 12 Bolivians will be sent abroad to acquire MA, MSc or PhD degrees from universities in the US or third countries. The TA team is responsible for advising on the selection of the candidates and the management of the program.

Promotion of Sustainable Natural Forest Management

The TA team, working with the communications specialist in the MDSMA, will initiate an information program to the forest products industry (timber and non-timber). This program will disseminate the result of the research and forestry planning and management work undertaken in the above steps in order to broaden and deepen the understanding, acceptance and adaptation of natural forest management practices. The team will formulate a publicity program based on the best available information on natural forest management plans, seeking both to stimulate and inform.

D4. Product Development Component

D4a. Introduction

This component focuses on the commercialization aspects of the project: timber and non-timber products and enterprise assistance. That is, those activities that are needed to increase the value and volume of timber and non-timber products harvested from the forest in a sustainable manner.

This component will be directed by the TA team itself, at least until a suitable Bolivian institution can be identified by the team and the MDSMA for this program. The TA team will work with and through various organizations such as: the CNF, production oriented NGOs, plant research groups such as the herbariums and Museo de Historia Natural, community organizations and the enterprises themselves. Likewise, the TA team will collaborate with other programs in Bolivia, such as AID's export and investment promotion program, the CORDEP program and the Fundacíon Bolivia Exporta. The product development specialist will take the lead in helping to establish a certification mechanism.

D4b. Requirements

The TA team will be responsible for the following:

(1) Timber Products

The timber industry is comprised of medium to large size enterprises with relatively high capital investments and employment levels, often controlling a timber concession and sometimes exporting; small enterprises which often procure their wood on the open market and sell to the domestic market; and artisans, either individuals, very small firms or cooperatives. The focus will be on "green" marketing (i.e. marketing of products produced in a sustainable manner, to markets that are likely to pay a premium price for such quality) of existing species, value added processing of existing species and green marketing and/or value added processing of new species.

The TA team will carry out the following types of activities as may be necessary to achieve the objectives of this component:

Analysis. Market analysis to provide information as to exactly which products can be marketed, how additional markets can be established and further opened, requirements and trends for certification.

Buyer contacts. Advice on sourcing agreements with wood products manufacturers in the U.S. and Europe.

Quality standards. Advice and training programs on international wood quality and grading standards for rough lumber and lumber products, including lumber grading and drying requirements.

Production capabilities. Establishment of new or expanded manufacturing capabilities to better utilize existing wood and new species for the emerging green market. Advice and training in the manufacturing of furniture components and other products, as well as on design, finishing, packaging and shipping.

Promotion. Promotional programs aimed at the green market.

Secondary species. Further investigation into availability, technical qualities and characteristics and markets for secondary species.

Workshops. Workshops and seminars to explain quality standards of international markets, as well as product standards.

Market tours. Visits to importing countries and attendance and participation in trade fairs to learn about the market and to promote Bolivian products.

(2) Non-timber Products

The technical analysis indicates that potential exists for product and market development of NTFPs such as Brazil nuts, cusi oil and activated charcoal from cusi, palm products, food, fibers, and medicinal plants. However, given the broad range of potential NTFPs and the difficulties of working with them, the strategy will be to organize activities in phases, based on specific criteria, which will lead to analyses and business plans for the various products under consideration.

Three categories will be used to further focus activities. First, products currently being sold or further processed for domestic and/or export markets, with known prospects for increased sales and further value added processing. Secondly, products with potential market outlets, based on existing data or knowledge of demand requirements, but where specific buyers or sales channels need to be identified and where sustainable cultivation and harvesting practices have to be tested. Thirdly, products where considerably more study has to be undertaken on both markets and sources of raw materials, such as plants for pharmaceutical uses.

The TA team will carry out the following tasks:

Selection criteria. Criteria for product selection will be further developed with counterparts to determine the basis for selecting and working on non-timber products.

Market analysis. Analysis will be undertaken to identify, screen and ultimately select products. Factors to be analyzed will include sales potential, competitiveness with other products and prices from other suppliers, market acceptance, sources of raw materials, processing technologies, conservation importance, and financial profitability.

Sustainability. Research on cultural and ecological sustainability of harvesting practices

Community interest. Determination of community interest and extent of current and potential future participation as potential employees and/or owners.

Business plans. Business plans will be prepared for those firms with interests and capability in making investments in products that can be commercialized. Plans will include specific information/technologies on sourcing raw materials, production and processing, storing, transporting, marketing and financing the investment, as well as managing the enterprise.

Market visits. Visits to importing countries and attendance and participation in trade fairs to learn about the market and to promote Bolivian products.

(3) Enterprise Assistance and Development

The term enterprise includes for-profit firms of all sizes, including community-based and indigenous group associations and cooperative enterprises. Except for the few large, vertically integrated firms (concessionaires with manufacturing plants) most of the enterprises engaged in the timber, non-timber areas are small and medium sized. As a rule, the project will direct its resources to existing enterprises, with a track record of several years. However, there may be occasions, when the project will help to establish a new business.

The TA team will provide the following types of assistance:

Financial and credit analysis, planning and budgeting. TA and training from project advisors and short-term specialists to assess the financial viability of an investment and the cash flow needs to support production and marketing, to analyze borrowing capacity and needs, to present and help obtain loan requests and to establish and implement financial controls.

Organizational or managerial strengthening or restructuring. Technical advice and training in managerial aspects of operating an enterprise effectively and efficiently, particularly in cases of fast growth or shifts of sales from domestic to export markets.

Legal advice. TA from U.S. and Bolivian lawyers may be needed to assess legal aspects, implications and protection of e.g. an investment in a new non-timber forest product.

Indigenous peoples support. Legal and technical advice on establishment and initial operations of a program to focus on the systematic exploration and classification of indigenous peoples knowledge of the forest and its products.

D5. Research Coordination

D5a. Introduction

This element is responsible for supporting the project's research efforts in the policy, forest management and product development components. The MDSMA (perhaps through its entity, FONAMA) will be the counterpart organization responsible for coordination of the research conducted in the forest management and product development components and for the linkages to the universities for student assistance. CDF and MDSMA will be the counterparts for research conducted under the policy analysis component.

D5b. Requirements

This element provides support to the research activities carried out in the components specified above. This work is carried out by various members of the TA team and the TA team's logistics advisor, in conjunction with the MDSMA research and training coordinators. This work includes provision of logistical support to the many field based research activities,

oversight of research grants/fellowships to assure proper expenditure of funds, coordination and linkages to Bolivian universities and research institutions to assure collaboration with national institutions.

Funds for research are contained in the contract budget's research line item, rather than being disaggregated by component. On a yearly basis, the TA team's specialists along with their counterparts, will prepare their annual program request for funds and subsequently carry out their research programs against the funding allocated.

D6. Training Coordination

D6a. Introduction

Training is a fundamental part of the design of this project and will be undertaken in each component. This element is responsible for supporting the project's training activities in the policy, forest management and product development components. The TA team will work with staff of MDSMA, CDF, CNF and other governmental and non-profit organizations in carrying out project activities. A training coordinator will serve as counterpart for this work.

D6b. Requirements

This element provides support to the training activities and needs of the components specified above. TA technical specialists (forester, ecologist, social scientist, wildlife specialist and marketing advisor) in conjunction with their counterparts, will formulate plans for in-country, third country and participant training to meet the needs of the entire project. The TA team's logistics coordinator and the counterpart training coordinator will assist the technical specialists. These plans will include logistical support of all types to the training programs, oversight to assure proper expenditure of funds, and coordination and linkages with Bolivian universities and training institutions to take advantage if in-country expertise. The training programs will seek to develop the capacity of junior professionals to perform, and guide them in the conduct of the field research on which the success of the project depends. The programs will alert and inform opinion makers on the major conservation issues, preparing them to make full use of the policy, ecological, institutional, and silvicultural research and analyses which the project will produce. The programs will update middle management capability through technical short courses, and train forest workers in desirable techniques for performing the work of forestry.

Funds for training are contained in the contract budget's training line item, rather than being disaggregated by component. On a yearly basis, the TA team's specialists, in conjunction with counterparts, will prepare their annual program request for funds and subsequently carry out their training programs against the funding allocated.

The TA team will be responsible for the following types of training.

Long-term training. This training is for masters and PhD students in the U.S. and other Latin American countries. An estimated 12 students will receive scholarships. In accordance with requirements of AID Handbook 10, the contractor will be responsible for assisting in the selection of candidates and of universities for their training, placing the trainees in the institutions, monitoring their progress and making payments for expenses.

Short-term courses. These two to four week courses are to be sponsored in Bolivia, the U.S. and third countries. In the U.S. and third countries, training will be conducted through attendance at existing programs/course offerings. In Bolivia, the courses will have to be customed designed, in conjunction with other training institutions.

Workshops and seminars. These one to five day workshops and seminars will be held in Bolivia or attendance in the U.S. and in third countries might be sponsored, e.g. to attend an international or regional event.

Field training. This training is likely to be conducted twice each year, from one to four weeks on site in the forests. This will be applied research and training.

Student projects. The TA team will direct student research projects that will serve both a training and research purpose.

D7. Monitoring and Evaluation, Information Network, and Communications

D7a. Introduction

The monitoring and evaluation, information and communications element will consist of three integrated parts: (1) an environmental database; (2) a project tracking management information system; and (3) an information network for project support, outreach and communication.

D7b. Requirements

The TA team will be responsible for the following tasks.

D7b(1). Baseline Data System for Environmental Monitoring

Database evaluation and accession. The baseline geographic data system for environmental monitoring will be established initially by evaluation and accession of existing geographically coded databases currently being managed and used by CORDECRUZ, CDC, ODA, and others. It is believed that the database which was developed by the German technical advisory team working with CORDECRUZ on design of a land use planning program is the most comprehensive available. The MIS/M&E advisor will make comparative assessment of this database and those used by CDC, and ODA as to accessibility, content, organization, compatibility, and ease of manipulation. Recommendations will be made to MDSMA, FONAMA and CDF as to which of these data bases are most appropriate for use in BOLFOR.

Development of baseline maps. Baseline maps (vegetation, soils, hydrography, fragility, current land use, and proposed potential land use) for the larger Santa Cruz tropical lowlands have already been developed through CORDECRUZ. As soon as the primary locations for project activities have been delimited, the MIS/M&E specialist with assistance from other TA team members, will be responsible for producing or contracting with other Bolivian agencies for the production of detailed maps at an appropriate scale for monitoring project activities on the locations selected.

Baseline studies and site monitoring program. The initial database and related planning maps will not provide the detailed information required to monitor change in the project area. Studies will be conducted in the first year by the TA team technical specialists in conjunction with the MIS/M&E specialist to determine the baseline conditions of biological and non-biological ecosystem components that could be affected directly by project activities and indirectly by changes in forest management practices encouraged by the project. Among other things, these studies will map forest types and distribution of commercially important species, as well as soil types, wetlands, and drainage patterns. Detailed inventories will be made of plant and animal species, as well as evidence of prior disturbance. Finally, a site monitoring program will be established on and around each project site to determine the impact of treatment on species composition, water quality, infiltration and runoff, soil compaction, and microclimate conditions (e.g., light and humidity).

Reports. The database will be designed to provide rapid retrieval of information on a geographic and topical basis, in abstract, tabular, graphic, or map form. Formats and retrieval formulae will be devised to provide periodic reports on environmental changes within the project sites, as well as site specific planning information.

D7b(2). Progress Tracking and Management Information System

Uniform activity description system. The TA team will use a project planning and budgeting system methodology to design a reporting system to monitor progress towards objectives, track project inputs and outputs and measure anticipated results as described in the performance indicators. The team will develop a uniform activity description process which will standardize the format for entering and retrieving activity data for reporting on progress.

Computerized management information system. The TA team will select suitable software and customize entry and reporting formats suited to the characteristics of the project, to facilitate reporting by component managers, and to meet the needs of project management for control and reporting.

Financial data. Budget information will be incorporated in the MIS and periodically analyzed to provide a basis for work planning and management decisions on resource allocation, costs and benefits of project activities.

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D7b(3). Information Network

Establishment of editing and audio-visual services. An editing and audio-visual aids publication capacity will be established in the MDSMA or contract services will be used to produce project bulletins (e.g. newsletters and other materials for promotion of forestry practices) and to assist scientists to prepare their materials for publication.

Public relations and communications. Public relations is a significant responsibility of the project. The TA team will prepare guidelines for all project public relations activities, including normal outreach activities and project publicity. The team will also advise the MDS on communications strategies.

International linkages. The project will establish routine domestic and international interchanges of information produced by or of use to the project, developing the necessary mailing lists and procedures.

D8. Procurement

D8a. Introduction

Procurement under this project will include a variety of requirements, some handled by AID, some by MDSMA/FONAMA, and some by the contractor. For the most part, the contractor will procure those commodities considered as technical in nature, while AID will procure general support items such as household furniture for advisors and project vehicles.

Procurement of those items that can be obtained locally and in a cost effective way would be procured in Bolivia (with approval by USAID as required). Procurement of computer hardware, software, and more technical equipment (with approval by USAID as required) would be sourced from U.S. manufacturers and distributors through the Contractor's procurement systems and under the supervision of its project administration support team.

D8b. Requirements

Appendix 1 contains a list of commodities to be procured and designates those items to be purchased by the contractor.

D9. Project Management

D9a. Introduction

The project structure will have three major components and several supporting elements each directed by an individual TA team advisor and/or a counterpart from a Bolivian implementing agency. These units will report to an administrative directorate comprised of an office within the MDSMA in LaPaz performing administrative and coordination functions and the institutional contractor's project office in Santa Cruz

performing managerial and technical functions in close proximity to the project's primary clients; i.e. the concessionaires, community groups and enterprises involved in forest products.

Primary counterpart organizations will include: the MDSMA (and its entity, FONAMA), and the CDF. An advisory committee will review the overall strategic direction of the project, examine critical research, environmental and policy issues, assess progress towards objectives against the work plan, bring lessons of experience from other countries and advise on future directions. The committee will meet one or two times each year.

D9b. Requirements

The contractor will be required to provide offices, secretarial and other support personnel, furnishings, computer hardware and software, logistical support such as vehicles and airplane rental.

The contractor will be required to provide office space to support a team of some 10 to 15 expatriate and Bolivian advisors, plus working space for support staff, a conference room, and space for short-term advisors and a library. Offices will be furnished with desks, chairs, bookcases, files, lamps and other normal requirements. The contractor will also pay for the operational costs of maintaining the office (to include such items as: phone, fax and other communications costs, utility expenses, office supplies, subscriptions to professional journals and purchase of technical materials), operating and maintaining the vehicles (such as insurance, fuel and repair costs) and rental expenses for travel by small aircraft.

The contractor will employee a local staff adequate to effectively support the technical advisors. Personnel such as office manager/administrator, several secretaries, accountant, office assistants and several drivers are anticipated.

E. Personnel/Staffing Requirements

E1. Introduction

The personnel required are comprised of several different technical and skills areas and include both expatriates and Bolivians. A staffing and level of effort chart follows. The general categories of personnel are:

Long-term Professionals:	Expatriate and Bolivian
Long-term Support:	Bolivian
Short-term Professionals:	Expatriate and Bolivian
Home-office Support:	Expatriate

E2. Requirements

Position descriptions for key personnel have been drafted and are included as Appendix 2. A overview of the requirements, anticipated nationality and estimated length of assignment is provided below.

E2a. Long-term Professional Personnel

Expatriates	Months
Chief of Party	78
Forester	36
Ecologist	36
Wildlife specialist	36
Economist	24
Product marketing specialist	36
Monitoring and evaluation and information systems specialist	24
Bolivian	
Forester	54
Ecologist	42
Wildlife specialist	42
Social scientist	36
Timber specialist	57
Non-timber products specialist	57
Economist	51
Monitoring and evaluation and information systems specialist	69
Logistics coordinator	48

E2b. Long-term Support Personnel

Administrator/office manager	78
Senior secretary	78
Junior secretaries (3)	222
Accountant	78
Drivers (3)	222
Database assistants (2)	144
Office assistants (1)	78

E2c. Short-term Professionals

An estimated 132 months of short-term, expatriate and Bolivian, level of effort will be provided. The following types of specialists are anticipated:

Policy. Economists, policy analysts, lawyers (21 months).

Institutional development. Organizational development, financial management, human resources development, training and curriculum development (22 months).

Natural forest management. Tropical foresters, forest soils, forest hydrologists, silviculturalists, biologists, ecologists, wildlife specialists, social scientists and anthropologists (32 months).

Product development. Marketing, forest industries, wood technicians, timber products, non-timber products, finance/credit, general business development (production, manufacturing, quality control, product design, etc.) transportation and storage (44 months).

Monitoring and evaluation. Management information and geographic systems, monitoring and evaluation, communications, publications (13 months).

Training and procurement. These requirements are discussed below.

E2d. Home-office Support

This support shall consist of supervisory and administrative personnel from the contractor's (prime and subcontractors) home-office staff, including the necessary expertise to assist in project management, administrative and financial systems, training and procurement. An estimated 57 months will be provided, including 10 months for training and 8 months for procurement services.

F. Reporting Requirements

F1. Introduction

Reporting requirements shall be satisfied through a variety of periodic and special reports on both project progress and problems as on the financial status of the contractor's budget.

F2. Annual Work Plans

The contractor shall prepare an annual work plan for each year of this contract. The contractor shall submit/deliver a draft of the first annual work plan to the AID and GOB project managers no later than three months after arrival of the COP. Following review and comments by the project mangers, the contractor shall then submit a final approved first year work plan within three weeks. Thereafter, the contractor shall prepare a work plan annually, (covering October 1 to September 30), and submit/deliver a draft to the project managers for review no later than July 31 of each year. The project managers will review the draft annual work plans and provide approval of the contents no later than August 30 of each year. The contractor shall then submit a final approved work plan no later than September 30 of each year.

F3. Periodic Progress Reports

F3a. Semi-annual Reports

By April 1 and October 1 of each year, the contractor shall submit two copies of a semi-annual report covering:

- Status of work under this contract, indicating progress made with respect thereto, and setting forth plans in the fields of activity covered under this contract.
- Trainees, and personnel employed in this contract.
- Publications, reports, workshops, seminars, information dissemination activities, and training.
- Milestone and scheduled completion dates for project activities.
- A projected budget for the next semester, which corresponds to the work plan.
- A financial report that details the line item budgets, shows expenditures against budget and a pipeline balance remaining.
- Current problems and recommended solutions.

F3b. Other Reports

Reports on implementation targets. The contractor will be required to report on progress toward meeting implementation performance standards. This information will be incorporated in the semi-annual reports.

Special reports. As required by the AID and GOB Project Managers, the contractor can be called upon to produce special reports on topics related to the contractor's work requirements.

Consultant and third country/cooperating country national (TCN/CNN) reports. The contractor shall submit/deliver to the RCO, an annual consultants and TCN/CCN report. This report shall cover the period October 1-September 30 of each year, and shall be submitted/delivered within 30 days from the end of the reporting period. The report shall list, by name, the consultants and TCN/CNN utilized under this contract during the reporting period, the activity or activities on which each consultant and TCN/CNN performed services, the actual daily rate paid to each consultant and TCN/CNN.

F4. Final Report

The contractor shall submit a Final Report to the Project Manager. This report shall be submitted in English not later than three months prior to the end of the contract, following receipt of comments from the Project Manager, the report shall be translated to Spanish.

The final report shall include:

- A summary of accomplishments.
- Overall descriptive analysis of progress in meeting the project's goal, purpose, EOPS and outputs and for reducing the degradation of forest, soil, and water resources and protect biodiversity during the period on this contract.
- An assessment of the significance of BOLFOR activities and future USAID/Bolivia programs.
- Provide comments and recommendations regarding unfinished work and/or project continuation and direction.
- Contain a summary fiscal report that describes how the contract funds were used in relation to contract accomplishments.

F5. Monthly Financial Reports

Monthly expenditure reports will be submitted with the monthly invoice to include a statement summarized by major line item and showing line item budget, expenditures against budget and balance remaining.

ATTACHMENT 1 - Commodity List

ATTACHMENT 2 - Position Descriptions

ATTACHMENT 3 - Phasing of Project Activities (chart)

COMMODITY LIST

OFFICE/CATEGORY	Commodity	Qty
	Reference Books	various
	Aerial photography equipment	as necessary
	Portable photosynthesis system	2
	Pressure plate	1
	Diffusion porometer	2
	Soil Moisture probes	50
	Weather station	2
	Electronic theodolites	2
	Surveying compasses	various
	Range finders	various
	tapes, levels, misc. tools	various
	Prenumbered tags corner posts	various
	(aluminum), mark.tape, nails, etc.	various
	Film (f.ground–bas.& aerial photo.)	various
	Aerial & ground–b.photo develop.	various
	175 cc motorcycles for field use	3
4. Product Development	**Equipment to be determined in future.** Could include items such as: simple oil press sheller or dehusker, packaging equipment, and other commodities related to certification requirements.	
5. Monitoring, Evaluation & Information Network & Communications		
	TECHNICAL EQUIPMENT	
	GPS – Remotes	2
	GPS – base station	1
	Software	as appropriate
	MacIntosh computers	2
	Printer	1
	Mapping Plotter	1
	TM Landsat Images on Tape	various
	Databases	4
	Technical supplies	as necessary

/* Indicates equipment that AID will procure.

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BOLFOR STAFFING REQUIREMENTS AND POSITION DESCRIPTIONS

Expatriates

CHIEF OF PARTY

Responsibilities. The chief of party has overall managerial, technical and administrative responsibilities for the implementation of the Bolivia Sustainable Forestry Management (BOLFOR) Project.

Duties/Tasks:

- Team leader. Provide a vision and overall leadership to the project team.

- Management. Oversee and direct an expatriate and Bolivian team of long and short term advisors from different technical backgrounds (forestry, silviculture, ecology, wildlife, management information systems, economics) and a support staff of administrative personnel. **Unless otherwise indicated, all team members will report to the Chief of Party.**

Manage the activities in several different project components and supporting elements, including: policy analysis and institutional development, natural forest management, product development, research, training and monitoring, evaluation, information network and communications. Directs, reviews and approves preparation of annual work plan and budgets.

- Technical activities. Take primary technical role in directing the sustainable forestry research activities, the major technical component of the project.

- Policy Dialogue. Advises Bolivian public, private and non-profit sectors on matters of change to various laws, regulations and policies affecting forestry and biodiversity in the country, including efforts to support the preparation and passage of a new forestry law.

- Coordination. Serve as advisor to several Bolivian government agencies and non-profit organization or trade associations (e.g. MDSMA, FONAMA, CDF, CNF) in order to coordinate and better leverage their various activities in the field of natural forest management. Work with other donors to obtain support to similar initiatives.

- Reporting. Provide various oral and written reports (e.g. briefings on project progress, written quarterly and annual reports, etc.) to AID and the Bolivian public, private and non-profit sector, as required in the contract and as needed to effectively implement the project.

• Represents Contractor. In all matters of contract implementation, and subject to delegations of authority from contractor's home office, represents the company in all matters of contract execution in front of the clients (AID the Bolivian government).

Qualifications. Substantial experience in managing complex, integrated development projects, preferably in Latin America. Experience in supervising large teams of advisors and/or in directing a multidisciplinary staff of e.g. 10-20 people. Experience in the formulation (conceptualization and design) and implementation of natural resources projects. Spanish fluency (minimum FSI level 3). Experience in advising on or conducting policy dialogue and in negotiations with high level government officials. Demonstrated leadership skills and capacity to make decisions. Educational background (advanced degree preferable) in economics, ecology, biology or forestry.

FORESTER

Responsibilities. The forester will coordinate forestry research, training and demonstration activities with the rest of the team and with all other interested parties. Collaboration with the forest ecologist will be particularly important to assure that practices are ecologically sound, environmental analysis requirements are met, and ultimately that forest management plans receive national and international certification. Establish practices that are technically feasible and profitable, and certifiably sustainable.

Duties/Tasks:

• Forest Management Research. Establish permanent plots for research, training and demonstrations. Design and conduct research on silvicultural practices as they affect growth, yield, and sustainability, both at the species and forest ecosystem levels. Coordinate with institutions the participation of students and professionals in research activities. Develop techniques for increasing the stocking and growth of commercially valuable species including methods varying in intensity and cost, ranging from enrichment planting along cleared lines to liberation of selected potential crop trees from competition. Develop and demonstrate timber stand improvement methods for increasing the sustainable yield of commercially valuable forest products upon which forest management plans can be based. Coordinate with other member of the team to help establish certifiable practices.

• Forest Engineering. Develop cost-effective and ecologically acceptable road construction and skidding methods, with particular attention to stream crossings and wetlands. Coordinate forest engineering operations with research on the mitigation of environmental effects of logging through low impact logging practices (e.g., comparative studies of damage to advanced regeneration, stream sediment loads and aquatic invertebrates).

• Training and Demonstration. Work with faculty and forestry students of Bolivian institutions to improve training and research programs in forestry and supporting fields.

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Develop a series of training modules in forestry and related fields, e.g. research methods, inventory and mensuration, management plan preparation, felling and extraction, decision-maker orientation, etc. Training will utilize permanent demonstration sites whenever possible. Together with the forest ecologist, assist CDF in improving its capability to review forest management plans. Assist CNF in developing its technical program.

- Inventory and Mapping. Formulate baseline data and monitoring systems to assure periodic updating of same. Develop cost effective inventory techniques using satellite imagery, available aerial photography, and a GPS equipped light aircraft-based false-color infrared and color video and medium format photography. Carry out inventories and other information gathering in support of research and later in support of forest management plan development.

Qualifications. A MS or MF degree or the equivalent and at least ten years of experience with silvicultural approaches appropriate for natural forest management in the tropics. The individual should have experience and an active interest in forestry research and its application to forest management and silviculture. This experience in forest management should encompass a wide range of resource users, from rural communities to large concessionaires. The individual must be able to deal effectively with other team members, government officials, campesinos, concessionaires and NGO representatives. Spanish fluency (minimum FSI level 3).

WILDLIFE SPECIALIST

Responsibilities. Oversee the administration of the biodiversity protection component, including the preparation of interim progress and final reports, as well as the identification and hiring of personnel. Select and orient appropriate Bolivian students involved in the monitoring and research program.

Duties/Tasks:

- Identify specific detailed research objectives.

- Supervision. Supervise and coordinate the biodiversity monitoring program in close collaboration with appropriate national and international institutions.

- Research. Coordinate the research on the impact of logging on wildlife and on the present subsistence and commercial uses of wildlife. This research will allow an evaluation of the potential for sustainable use of wildlife.

- Supervise and teach biodiversity conservation and wildlife ecology in both short- and semester-long courses in Bolivia.

- Participate in small grants program to support thesis research by Bolivian students. Where appropriate, supervise such students.

• Identify and select Bolivian students for masters and Ph.D.-level training in biodiversity conservation.

Qualifications. A Ph.D. degree in conservation, wildlife ecology or a related field. Field research experience with neotropical wildlife. Experience in rapid survey techniques and with long-term field research. Experience in the logistics and coordination of biodiversity monitoring programs. Experience with teaching biodiversity conservation courses, both academic and field-based. Experience supervising undergraduate students, particularly for thesis project. Experience in Bolivia, especially in the field. Knowledge of the research and conservation community in Latin America and in Bolivia in particular. Written and spoken proficiency in Spanish (FSI 3 level) and English. Proficient in the use of computers, especially in the handling of databases.

PRODUCT DEVELOPMENT AND MARKETING SPECIALIST

Responsibilities. The product development and marketing specialist directs product development component, including activities that encompass timber and non-timber products development and marketing and enterprise development. Reports to chief of party.

Duties/tasks:

• Product development and marketing. Based on criteria to be formulated and agreed upon, identify, screen and subsequently analyze potential and opportunities for marketing Bolivian products to export markets (primarily) and increasing sales to domestic markets (secondarily).

• Feasibility analysis. Conducts and directs others in conducting full feasibility analyses of product potential, including: research on markets, prices, channels of distribution, import/export requirements, quality and regulatory standards, transportation and storage modes and cost, production and processing/manufacturing quality, quantities and costs and sources/costs of raw materials, as well as sustainability of cultivation and harvesting practices, and a financial analysis of projected costs and revenues.

• Business plans. Prepares and directs others in preparing plans for starting or expanding a business, including management, financial and implementation plans based on the findings of the feasibility analysis referred to above. Assists entrepreneurs and community groups in obtaining financing for their investment and working capital needs.

• Enterprise Assistance. Provides assistance to enterprises currently involved in timber products and non-timber products and wishing to expand operations. Assists in formation of new ventures for production and marketing of forest based products and services. Such assistance can range from production to marketing, with some or all of the usual business functions in between (such as finance, management, processing, transport, storage distribution, etc.)

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• Advisory. Advises representatives from the Bolivian government, private and non-profit sectors on constraints to increased revenues and employment to be obtained forest products and services and on policies to improve the environment for investment; advises on product opportunities and potential, on technologies suitable for processing, on marketing approaches - including buyer contacts, on sustainable (environmentally benign) production and harvesting practices, on labor relations within communities living in the forests, and on all other aspects required to take a product from production to market.

• Training. Directs training activities, seminars and workshops in the field of forest products and services.

• Leadership/Management. Supervise a small staff (1-2 persons) directly involved in this component, including specialists in timber products, non-timer products and ecotourism. Lead small teams comprised of specialists from other functional areas (e.g. social scientists and ecologists) in group efforts to investigate sustainability of product raw materials. Supervises short term specialists Bolivian and expatriate in their assistance to this component.

Qualifications. Experience in marketing, product and business development, preferably in Latin America. Familiarity or ability to work with a broad range of products and product lines. Skills in market studies and financial and feasibility analysis and preparation of business plans. Education background in business or marketing. Spanish fluency at the FSI 3 level.

ENVIRONMENTAL INFORMATION SPECIALIST (M&E/MIS)

Responsibilities. The Environmental Information Specialist coordinates the Environmental, Monitoring and Evaluation element and reports directly to the project COP. The Environmental Information Specialist has a key project role in integrating the monitoring and reporting systems of the project and supporting the three project components.

The Specialist will be responsible for the development, implementation, and maintenance of: 1) environmental databases, 2) project tracking management information system, and 3) an information network for project support, outreach and communication. The specialist will coordinate monitoring and reporting activities from the policy, forest management and product development components.

S/he will be responsible for relating to counterpart agencies and for devising a strategy to gradually train and turn over the activities of this component over to them.

Duties/Tasks:

• Information systems. Work with the component advisors to establish and maintain an information system to generate silvicultural, economic, and social information which will provide the basis for designing improved methods for sustainable forest management, including for assessing the impacts of forestry activities on the environment and on

biodiversity, and for determining the economic and ecological sustainability of forest management practices.

- Reporting system. Establish and maintain a project input/output system to track project progress using a planning and budgeting system methodology to control and report at the activity level and consolidate to target output levels.

- Information network. Establish and maintain a central information network to provide all project components with services in managing and disseminating information, including linkages to national and international networks in topic of interest to the project and its participants.

Qualifications. Ten years experience in the design, analysis and operations of data management systems in programs or projects related to natural resources, including the use of GIS. Educational background in environmental sciences, forestry, or forest ecology, or natural resource management/economics or social science. S/he should have demonstrated ability to work with multidisciplinary teams, have a broad understanding of natural resource management and socioeconomic impact issues, and have experience teaching/training local staff and counterpart technicians. Spanish fluency (FSI 3 level).

Bolivian Professionals

NATURAL RESOURCES ECONOMIST

Responsibilities. In conjunction with other team members and short term specialists, directs the policy component of the BOLFOR project and is responsible for the production of reports and analyses related to policy and economics.

Duties/Tasks:

- Research Design. Design economic studies of natural forest management to be used as a basis for recommending changes in government policy and private sector management behavior.

- Supervision. Supervise a number of contractors and employees in the collection of field data and writing of research reports.

- Communications. Effectively communicate research findings and recommendations to a broad and diverse audience of policy makers, government officials, and other affected parties in the public and private sectors, both in Bolivia and abroad.

Qualifications. Education and work experience in economics with additional training or experience in biological sciences desirable. Work experience related to natural resource issues in Latin America and demonstrated ability to design and carry out applied research in

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natural resource economics. Clear writing style and effective public speaking abilities a plus. The successfully candidate should be comfortable working in an interdisciplinary setting, and be able to manage a number of contractors. Reading, writing, and conversational proficiency in English required.

FORESTER

Responsibilities. The Bolivian forester will assist in the coordination of forestry research, training and demonstration activities with the rest of the team and with all other interested parties.

Duties/Tasks: These tasks will be done in conjunction with the expatriate forester.

- Forest Management Research. Establish permanent plots for research, training and demonstrations. Design and conduct research on silvicultural practices as they affect growth, yield, and sustainability, both at the species and forest ecosystem levels. Coordinate with institutions for the participation of students and professionals in research activities. Develop techniques for increasing the stocking and growth of commercially valuable species including methods varying in intensity and cost, ranging from enrichment planting along cleared lines to liberation of selected potential crop trees from competition. Develop and demonstrate timber stand improvement methods for increasing the sustainable yield of commercially valuable forest products upon which forest management plans can be based. Coordinate with other member of the team to help establish certifiable practices.

- Forest Engineering. Develop cost-effective and ecologically acceptable road construction and skidding methods, with particular attention to stream crossings and wetlands. Coordinate forest engineering operations with research on the mitigation of environmental effects of logging through low impact logging practices (e.g., comparative studies of damage to advanced regeneration, stream sediment loads and aquatic invertebrates).

- Training and Demonstration. Work with faculty and forestry students of Bolivian institutions to improve training and research programs in forestry and supporting fields. Develop a series of training modules in forestry and related fields, e.g. research methods, inventory and mensuration, management plan preparation, felling and extraction, decision-maker orientation, etc. Training will utilize permanent demonstration sites whenever possible. Together with the forest ecologist, assist CDF in improving its capability to review forest management plans. Assist CNF in developing its technical program.

- Inventory and Mapping. Formulate baseline data and monitoring systems to assure periodic updating of same. Develop cost effective inventory techniques using satellite imagery, available aerial photography, and a GPS equipped light aircraft-based false-color infrared and color video and medium format photography. Carry out inventories and other information gathering in support of research and later in support of forest management plan development.

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Qualifications. An undergraduate degree and at least five years of experience with silvicultural approaches appropriate for natural forest management in the tropics. The individual should have experience and an active interest in forestry research and its application to forest management and silviculture. This experience in forest management should encompass a wide range of resource users, from rural communities to large concessionaires. The individual must be able to deal effectively with other team members, government officials, campesinos, concessionaires and NGO representatives. Reading and writing proficiency in English required.

FOREST ECOLOGIST

Responsibilities. In close collaboration with other team members and short term specialists, the forest ecologist will direct research activities related to assessing the impacts of all facets of forestry on ecosystem processes, biological diversity and species of particular concern.

Duties/tasks:

- Research. Develop a research program on the ecological basis and consequences of forest management. Supervise 5-10 researchers per year working on a wide range of projects (e.g., population stability under different harvesting regimes, nutrient losses associated with logging, and etc.). Carry out research with the forester on currently under utilized commercial tree species, ascertaining the potential impact of harvesting on wildlife and ecosystem processes. Coordinate and/or carry out research on non-timber forest products, assessing the potential impacts of harvesting on wildlife and ecosystem processes of harvest. Establish initial data base and approaches to periodically update the information to assure proper monitoring of the program's activities and results.

- Training. Direct a training program. Establish procedures for selection and placement of candidates for graduate training. Coordinate thesis research topic selection and logistics for supervising faculty field visits. Provide overall direction to short term training programs. Participate in teaching courses in conservation, forestry, economic botany, and etc. Offer special courses on population biology, physiological ecology, etc. Publish research results jointly with research collaborators in international refereed journals and in Bolivian publications that reach local and national audiences.

- Environmental Assessments. Prepare scopes of work and participate in EAs called for by USAID. Conduct Environmental Reviews as required. Assure that research conducted under the project contributes to mitigation of the environmental impacts of project activities.

- Dissemination. Prepare articles for publication in collaboration with Bolivian researchers and other team members.

Qualifications. A degree in forest ecology or a closely related field with at least 3 years of experience in the tropics. A familiarity with the literature and field research experience in

both forest ecology and commercial forestry is essential to establishing a practical basis for ecologically sustainable and certifiable forest management. Proficiency in English.

WILDLIFE SPECIALIST

Responsibilities. Assist in the administration of the biodiversity protection and monitoring activities, including the preparation of interim progress and final reports. Select and orient appropriate Bolivian students involved in the monitoring and research program. Report to the expatriate wildlife specialist.

Duties/Tasks: These tasks are carried out in conjunction with the expatriate wildlife specialist.

- Identify specific detailed research objectives.

- Supervision. Assist with supervision and coordination of the biodiversity monitoring program in close collaboration with appropriate national and international institutions.

- Research. Help coordinate field research on the impact of logging on wildlife and on the present subsistence and commercial uses of wildlife. This research will allow an evaluation of the potential for sustainable use of wildlife.

- Supervise and teach biodiversity conservation and wildlife ecology in both short- and semester-long courses in Bolivia.

- Participate in small grants program to support thesis research by Bolivian students. Where appropriate, supervise such students.

- Identify and select Bolivian students for masters and Ph.D.-level training in biodiversity conservation.

Qualifications. A degree in conservation, wildlife ecology or a related field. Field research experience with neotropical wildlife. Experience in rapid survey techniques and with long-term field research. Experience in the logistics and coordination of biodiversity monitoring programs. Experience with teaching biodiversity conservation courses, both academic and field-based. Experience in Bolivia, especially in the field. Knowledge of the research and conservation community in Bolivia. Written and spoken proficiency in English preferred. Proficient in the use of computers, especially in the handling of databases.

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TIMBER MARKETING SPECIALIST

Responsibilities. Analyze the raw materials and value adding capabilities of a variety of enterprises, and translate this information into strategies for research, training and market development.

Duties/Tasks:

- Market Assessment. Conduct an iterative process of identification of raw materials and matching these with potential markets. Conduct economic and technical feasibility studies of candidate market links taking into consideration environmental constraints, conventional and green market access and comparative advantages, skills and capitalization of Bolivian industries, and transportation costs.

- Research. Commission applied research on opportunities and constraints associated with potential products, e.g. mechanical properties, response to drying, working, application of preservatives and finishes, etc.

- Training and Assistance. Establish training programs for wood industries manufacturing products for identified markets. Where cost effective, assist wood industries in installing wood drying equipment. Design and implement training courses for Bolivian producers on international quality standards for wood and non-timber products, production methods, and quality control.

Qualifications. Appropriate training and experience needed to carry out assigned tasks. Must have crrent knowledge of markets and market trends for tropical hardwood products.

NON-TIMBER FOREST PRODUCTS SPECIALIST

Responsibilities. The non-timber forest product specialist will be responsible for assessing the importance and viability of developing several non-timber forest products (NTFPs) from the project area. The specialist will develop business plans for at least two of these products and facilitate the funding and implementation of these plans. Reports to the expatriate products marketing specialist.

Duties/Tasks:

- Identify high potential NTFPs in project area, based on analysis of existing exports and discussions and networking with business leaders, trade associations, funding agencies, development groups, community groups and researchers, and a complete literature review.

- Oversight of in-depth feasibility studies for selected products based on economic, cultural and ecological criteria. The economic study will be conducted by the specialist with outside consultant help. The ecological and social studies will be coordinated with other team members doing research in the project.

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• Creation of business plans for at least two products based on selections made within the product development component with review by other project personnel and outside advisors. Plans will be written under the supervision of the specialist with assistance from outside consultants.

• Facilitate funding and implementation of business plans by marketing the plans to potential private sector partners, development agencies, lenders, etc. The plans should be developed in a collaborative manner with the stakeholders of a particular project and should include a well-formed action plan for implementation.

Qualifications. The specialist should have at least five years of work experience in production, marketing, import/export, and familiarity with working in rural environments using appropriate level technologies. Experience in producing and marketing forest products from Latin America is desirable. Education background should be in business and marketing. The specialist should be an excellent communicator with considerable ability to network within the business, scientific, and rural development communities. The specialist should be fluent in written and spoken Spanish and English.

SOCIAL SCIENTIST

Responsibilities. The social scientist has the overall responsibility of linking rural communities and indigenous populations with the various project component activities. The social scientist will also be responsible for implementing a program on Indigenous Forest Knowledge/Use Technologies, and a survey methodology on the nutritional and economic value of wildlife and plants for rural communities in project areas.

Duties/Tasks:

• Participate in studies planned in each of the project components, such as the value of hunted game, the viability of community forestry projects, and monitoring the impact of forest production activities on rural populations; provide a gender perspective and appropriate methodologies for such studies, as appropriate, in addition to more general social science perspectives.

• Establish linkages between different project activities and rural communities in areas of interest to BOLFOR. When appropriate include NGOs in the linkages.

• Establish BOLFOR's program on Indigenous Forest Use technologies in communities within BOLFOR sites.

• Design and implement a research protocol to retrieve Indigenous populations knowledge/use of forest products. Identify forest products that may have market potential in collaboration with the product development experts.

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• Design and implement a survey methodology to monitor the nutritional and economic value of forest derived food for rural communities within BOLFOR sites.

• Establish and maintain a network of community based research collaborators in up to four communities in the two project sites to implement the program and survey mentioned above.

• Expand the network (communities and collaborators) as needed throughout the project life. Seek and enlist collaborating institutions (NGOs/Donors) to expand the program and survey to communities and indigenous populations outside the project area.

Qualifications. Over ten years experience in development projects and in rural community research. Experience in social research methods (surveys, rapid appraisal, participant observation). Experience in design and implementation of participatory research and development programs. Experience in working with multi-disciplinary teams. Educational background in the social sciences. Fluency in English, as well as additional educational background and experience in human nutrition highly desirable.

INFORMATION SPECIALIST

Responsibilities. Assists in the coordination of the Environmental, Monitoring and Evaluation activities of the project. As such, s/he will play an important role in the design and integration of the monitoring and reporting systems, in supporting the three project components, and, in coordination with the expatriate Environmental Information Specialist (M&E/MIS), in keeping GOB counterpart institutions appropriately informed and involved on project progress towards achievement of objectives.

Specific tasks will include assisting with the development, implementation, and maintenance of: 1) environmental databases; 2) project tracking management information system; 3) an information network for project support, outreach and communication. Beginning in year 3 of project implementation, will assume primary responsibilities for these tasks.

Duties/Tasks: These tasks are carried out in conjunction with the expatriate Environmental Information Specialist (M&E/MIS).

o Information systems. Work with the component advisors to establish and maintain an information system to generate silvicultural, economic, and social information which will provide the basis for designing improved methods for sustainable management of tropical forests, as well as for assessing the impacts of forestry activities on the environment and on ecological diversity, and for determining the economic and ecological sustainability of forest management practices.

o Reporting system. Help maintain a project input/output system to track project progress towards objectives.

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o Information network. Help maintain and keep up to date a central information network to provide all project components with services in managing and disseminating information, including linkages to national and international networks in topics of interest to the project and its participants.

Qualifications. Two years experience in the design, analysis and operations of data management systems in programs or projects related to natural resources. Educational background in environmental sciences, forestry, forest ecology, or natural resources management/economics or social science. S/he should have demonstrated ability to work with multidisciplinary teams, and have a broad understanding of natural resource management and socioeconomic impact issues. Fluency in English is required.

LOGISTICS COORDINATOR

Responsibilities. The logistics coordinator is responsible for making the arrangements necessary to carry out the diverse research and in-country training activities planned for BOLFOR. The logistics coordinator will be based in the project management unit and will report to Office Manager.

Duties/tasks. S/he will work with the TA team specialists as needed in the planning and implementation of all field activities related to research and training. This will include planning and procurement of all inputs needed for project teams to successfully work in isolated and harsh field settings. Specific responsibilities will range from securing airplanes to fly the team to sites to setting up camps and supplying them with food and equipment.

Qualifications. Demonstrated capacity to field team to remote and isolated sites and to be able to supply them with needed equipment and food throughout the length of the assignment. S/he should have proven skills in problem solving and in human relations. Ability to work under pressure and a sense of humor essential.

Bolivian Support Staff

OFFICE MANAGER/ADMINISTRATOR

Responsibilities. Oversee the work of the administrative and support staff.
On a continuing basis, ensure that all administrative activities undertaken for and by the BOLFOR technical assistance team are carried out effectively, efficiently, smoothly, and in accord with the terms of reference of the contract between USAID/Bolivia and the prime and subcontractors.

Duties/tasks. Supervise all local hire support staff. Supervise the operation of the field offices established to accomplish the purposes of the contract and project. Ensure the submission of all required plans, reports and approvals, with appropriate content and on a

timely basis. Take the lead in preparing all administrative documents. Provide support and monitor the preparation technical documents. Monitor the draw down of level of effort and financial resources allocated in the contract and related budgets, making recommendations for future adjustments as needed. Manage all administrative processes relating to the recruitment and employment of short-term advisors. Coordinate all administrative and technical support needed from contractor's U.S. offices.

Qualifications. Effectively administered one long-term project including recruitment, personnel, benefits administration, financial monitoring, project accounting, and project tracking. Advanced Word Perfect and Lotus skills. Familiar with GOB and USAID accounting. Fluency in English. Conversant with GOB and AID regulation sufficient to interpret their application on BOLFOR. Demonstrated ability to work independently, with minimal supervision.

ACCOUNTANT

Responsibilities. Under the direction of the office manager, the accountant implements the local accounting system.

Duties/tasks. **Accounts payable:** Prepares disbursement memos and checks for signature by the team leader. Ensures that checks are properly mailed or delivered. **Travel expenses:** Issues travel advances. Reviews and corrects expense reports drafted by team members, then processes payments. **Bank accounts:** Requests and processes funds transfers. Manages project checkbook. Does a monthly account reconciliation. **Documentation:** Maintains appropriate documentation for all locally-incurred project expenses. **Inventory:** Provides Chemonics home-office with timely and accurate information on the acquisition and disposition of all project equipment and commodities, including furniture held by team members. **Bookkeeping**: Operates the SOLOMON-based accounting systems. Posts all expenses. Prepares monthly trial balances. **Invoices:** Prepares the monthly local accounts for transmission to the home-office. **Timesheets:** Ensures that timesheets are properly filled out and submitted every month in a timely fashion by all BOLFOR staff members, and sends them promptly to the home office. **Logs:** Maintains telephone/fax logs to control and bill for personal use of phones, as well as other logs needed.

Qualifications. Accounting or business degree and at least five years work experience in administrative/accounting functions. Computer literacy.

SENIOR SECRETARY

Responsibilities. Provides full time, day to day support to the Chief of Party of the BOLFOR project. Functions include normal secretarial duties in addition to assisting with special projects.

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Duties/tasks. Manages daily office operations, including accounting, finances, document production, facilities management. Supervises other support staff. Provides support for COP in all functions.

Qualifications. At least four years of work experience as executive secretary. Bilingual Spanish and English. Advance computer skills in word processing, spreadsheet and data base (Word Perfect, Lotus and Fox preferred). Strong organizational and supervisory skills. Accounting and budgeting experience. Familiarity with Bolivian public and private sector offices and their operation.

JUNIOR SECRETARY

Responsibilities, duties/tasks, and qualifications will be specified by the COP and Office Manager as needed during the setting up of the project offices.

PHASING OF PROJECT ACTIVITIES CHART

The project's activities will be implemented in phases, in the following manner, as outlined in the EA.

PHASE 1 (Years 1 & 2)

Core Components:

Policy analysis and institutional development
- reach agreement on plan of economic analyses
- initiate economic analyses
- conduct several workshops for debate of forestry law
- conduct deeper institutional assessments of: CDF/Santa Cruz
- for CDF/Santa Cruz, make recommendations on adjustments, if any, for project role and involvement
- for regional MDS's, begin strengthening activities to assist in establishing Santa Cruz office
- formulate monitoring and reporting systems for component activities
- identify long term economist training candidate

Natural forest management
- reach agreements with one concessionaire and one community group for management assistance
- obtain GOB authorization to continue site work for LOP
- identify sites for field testing of management practices
- take inventories of forest lands on above sites
- initiate tests on demo sites
- conduct base line inventories of biological and non-biological characteristics of study area and establish site monitoring program
- initiate comprehensive research agenda, beyond demo sites
- initiate research on: forest management practices, flora and fauna, indigenous peoples
- continue research activities in Bosques Chimanes
- formulate monitoring and reporting systems for component activities, particularly for tracking environmental impacts
- identify long term training candidates

Product development
- examine implications for certification requirements
- develop plan to meet certification requirements
- confirm market potential for 1 or 2 "category one" NTFPs
- begin research/testing of sustainable cultivation and harvesting practices for those 1 or 2 NTFPs with market potential
- review market potential for value added processing and green marketing for 1 or 2 timber products using existing species
- where feasible, initiate assistance activities on above products
- establish baseline data on timber and NTFPs
- formulate monitoring and reporting systems for component activities

Support Elements

Monitoring, evaluation and information systems
- Establish basic reporting and M&E systems (from core components)
- Establish baseline data and procedures for updating; begin collecting
- Identify Bolivian organizations (e.g. FAN) that have capacity to provide monitoring services; initiate contracts
- Acquire essential data bases for forest inventories, land use planning, etc. from internal and external sources
- Establish information networking systems

Research coordination
- Formulate training program for Bolivian students to carry out research needs of project, under direction of TA advisors
- Establish formal, Bolivian university-approved program
- Establish criteria for research program review and approval (to be done on a yearly basis to obtain funding)
- Establish procedures to assure collaboration on research needs across each core component

Training Coordination
- Establish criteria for selection of LT training candidates and potential universities for masters and Phd training
- Assist in selection process - schools and candidates
- Send students abroad
- Assist core component managers in formulating training plans for in-country seminars and short courses abroad

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PHASE 2 (Years 3 & 4)

Core Components

Policy analysis and institutional development
- continue economic analyses
- continue workshops and seminars for policy dialogue
- begin to formulate recommendations on policies, rules, regulations, enforcement mechanisms, pricing incentives, etc
- continue institutional development plans and assistance to regional MDS and/or to CDF/SC, as appropriate

Natural forest management
- commence forest management work with initial concessionaire and community group beyond demo sites
- identify other groups/sites for assistance
- conduct EAs or ERs on other sites
- take forest inventories on other sites
- initiate management plans for other groups/sites
- continue initial research activities; expand as appropriate
- continue long term training
- expand short term training: numbers of people trained and types of programs offered

Product development
- work to meet requirements of certification, including possible establishment of public/private council for monitoring compliance
- continue research on sustainable practices
- continue commercialization of initial timber and NTFPs
- analyze markets for 1 or 2 additional NTFPs
- conduct EAs on additional products, as needed
- initiate additional research on sustainable practices of additional NTFPs
- analyze "green" and value added markets for 1 or 2 secondary timber species
- initiate research on sustainability of these species
- begin commercialization of new timber and NTFPs
- initiate enterprise assistance activities, as needed

Support Elements

Monitoring, evaluation and information systems
- continue reporting, per the agreed upon procedures
- evaluate work to date and make adjustments

- begin dissemination activities for research findings
- initiate communications programs

Research coordination
- monitor training program for Bolivian students to carry out research needs of project
- coordinate yearly research program review and approval; program funding
- monitor collaboration on research needs across each core component
- assist in reporting on progress and findings

Training Coordination
- monitor progress of LT trainees
- assist core component managers in formulating training plans for in-country seminars and short courses abroad
- support major increase in training activities
- provide necessary logistical support for in-country training, especially field based events
- report on training activities

PHASE 3 (Years 5 to 7)

Core Components

Policy research and analysis and institutional development
- continue economic analyses
- refine policy recommendations
- troubleshoot institutional strengthening needs

Natural forest management
- reach agreements with other concessionaires/communities
- take forest inventories
- develop management plans for other groups
- conduct EAs or ERs, as needed
- continue forest management work with Phase 1 and 2 concessionaires and community groups
- promote widespread adoption/diffusion of natural forest management practices
- evaluate and report on results
- continue research activities
- continue long and short term training

Product development
- oversee certification procedures; assist in compliance

and enforcement as appropriate
- continue research on sustainable practices
- continue commercialization of previous timber and NTFPs
- analyze markets for 1 or 2 additional NTFPs
- initiate research on sustainable practices for additional NTFPs
- conduct additional EAs or ERs, if needed
- initiate commercialization of products from secondary timber species
- promote consideration of "green" markets and value added products to broader audience of entrepreneurs and community groups
- provide information to support value added processing and "green" marketing
- expand enterprise assistance efforts

Support Elements

Monitoring, evaluation and information systems
- continue reporting, per the agreed upon procedures
- conduct necessary EAs or updates for
  -- other timber and non-timber products
  -- other forest management plans

Research coordination
- monitor training program for Bolivian students to carry out research needs of project
- coordinate yearly research program review and approval; program funding
- monitor collaboration on research needs across each core component
- assist in reporting on progress and findings

Training Coordination
- monitor progress of LT trainees
- assist core component managers in conducting in-country seminars and short courses abroad
- provide necessary logistical support for in-country training, especially field based events
- report on training activities

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4/30