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USAID/Bolivia's Country Strategy 2004-2009

Bolivia Country Analysis of Tropical Forests and Biological Diversity

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The views and recommendations expressed in this report are solely those of the ARD Assessment Team and are not necessarily those of USAID or the USG.

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Acronyms and Abbreviations

AD	Alternative Development
ASL	*Agrupación Social del Lugar* (Site Social Group)
BOLFOR	Bolivia Sustainable Forest Management Project
BOLINVEST	*Fundación para el Desarrollo de Exportaciones y Apoyo a la Pequeña Empresa* (Foundation for Exportation Development and Small Enterprise Support)
CADEFOR	*Centro Amazónico de Desarrollo Forestal* (Amazon Center for Forest Development)
CADEX	*Cámara de Exportadores* (Chamber of Exporters)
CAF	*Corporación Andina de Fomento* (Andean Promotion Corporation)
CANEB	*Cámara Nacional de Exportadores de Bolivia* (Bolivian National Chamber of Exporters)
CCA	Cromated Copper Arsenical
CDF	*Centro de Desarrollo Forestal* (Center for Forest Development)
CEPROBOL	*Centro de Promoción Bolivia* (Bolivian Promotion Center)
CFPC	Certified Forest Products Council
CFV	*Consejo Boliviano Certificación Forestal Voluntaria* (Bolivian Voluntary Forest Certification Advisory Body)
CI	Conservation International
CIBID	Democratic Development and Citizen Participation
CIDES	*Centro Integral de Desarrollo Económico y Social* (Center for Integrated Economic and Social Development)
CIFOR	Center for International Forest Research
CIPA	*Centro de Investigación y Preservación de la Amazonia* (Center for Amazon Research and Preservation)
CIRAD	*Centre de Coopération Internationale en Recherche Agronomique pour le Développement* (French scientific organization specializing in agricultural tropical research)
CSIRO	Commonwealth Scientific and Industrial Research Organization
CITES	Convention on International Trade of Endangered Species
COSUDE	Swiss Development Assistance Agency
DAP	Development Assistance Program
DFID	Department for International Development (British Development Assistance Agency)
DGB	*Directorio General de Biodiversidad* (Directorate General of Biodiversity)
EE&C	Environmental Education and Communication
ENV	Environment
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization of the United Nations
FCBC	*Fundacion de la Conservacion del Bosque Chiquitano* (Foundation for the Conservation of the Chiquitano Forest)
FONABOSQUE	*Fondo Nacional para el Desarrollo Forestal* (National Forest Development Fund)
FONAMA	*Fondo Nacional de Medio Ambiente* (National Environmental Fund)
FORINTEX	Canadian Corporation (Canadian Wood Products Research Institute)
FUNDA-PRO	Foundation for Production
FY	Fiscal Year
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GFTN	Global Forest Trade Network
GNP	Gross National Product
GOB	Government of Bolivia

IADB	Inter-American Development Bank
IBAMA	*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* (Brazilian Environmental and Renewable Nature Resources Institute)
IBCE	*Instituto Boliviano de Comercio Exterior* (Bolivian Institute for Exterior Commerce)
INRA	*Instituto Nacional de Reforma Agraria* (National Institute for Agrarian Reform)
ITTO	International Timber Trade Organization
JIT	"Just-in-Time"
LKS	Lesser-known Species
MDSP	*Ministerio de Desarrollo Sostenible y Planificacion* (Ministry of Sustainable Development and Planning)
MOU	Memorandum of Understanding
NGO	Nongovernmental organization
NTFP	Non-timber forest product
OTB	*Organizacion Territorial de Base* (Base or Fundamental Territorial Organization)
PCI	Project Concern International
PROMAB	*Programa Manejo del Bosques de la Amazonia Boliviana* (Program for the Management of Bolivian Amazon Forests)
SEAF	Small Enterprise Assistance Fund
SERNAP	*Servicio Nacional de Areas Protegida* (*precursos to SNAP*-National Protected Areas Service)
SFM	Sustainable Forest Management
SIF	*Superintendencia Forestal* (National Forest Service)
SIFORBOL	*Sistema de Informacion Forestal de Bolivia* (Bolivian Forest Information System)
SNAP	*Systema Nacional de Areas Protegidas* (Nacional Protected Areas System)
SNGM	*Servicio Nacional de Geología y Minería* (National Geology and Minerals Service)
SNIDS	*Sistema Nacional de Información para el Desarollo* (National System for Development Information)
SO 1	Democracy
SO 2	Economic Opportunities
SO 3	Health
SO 4	Environment
SO 5	Alternative development
SO	Strategic Objective
STCP	Brazilian Engineering and Consulting Firm
TCO	*Tierra Communitaria de Origen* (Comunal Land Originator)
TNC	The Nature Conservancy
UNDCP	United Nations Drug Control Program
USAID	United States Agency for International Development
USDA/FPL	United States Department of Agriculture Forest Products Lab
USDA/FS	United States Department of Agriculture Forest Service
USGBC	US Green Building Council
VIMDESALT	*Viceministerio de Desarollo Alternativo* (Under-Ministry of Alternative Development)
WB	World Bank
WCS	Wildlife Conservation Society
WWF	World Wildlife Foundation

Executive Summary

Purpose of the Report

Sections 118 "Tropical Forests" and 119 "Endangered Species" of the 1986 Amendments to the Foreign Assistance Act (FAA) require each USAID Mission, as part of the preparation of its five-year Strategic Plan, to:

- Define actions necessary in the country to achieve sustainable management of tropical forests and conservation of biological diversity, and
- Determine the extent to which the actions proposed for support by USAID meet the needs thus identified.

The report is intended to comply with these requirements for USAID/Bolivia's Strategic Plan 2004–2009.

Background

Since 1996, Bolivia has made important advances toward the goal of sustainable management and conservation of its tropical forests and biological diversity. USAID/Bolivia has supported these advances through model programs of policy development, technical assistance, training and research. The program has included not only the Bolivia Forest Management Project (BOLFOR) supported by Environment, but also activities and projects executed under the Alternative Development and Economic Opportunities Strategic Objectives (SOs) and PL-480.

Partners of PL-480 and the Jatun Sach'a project have pioneered community forestry development activities in the Andean Highlands and in Chapare, respectively. USAID has also been instrumental in defining and supporting a national system of parks and protected areas which now cover approximately 16 million hectares. Finally, markets for wood and wood products are being improved through promotion and quality improvement efforts.

Bolivians and USAID are rightfully proud of these achievements, and they are determined to continue Bolivia's world leadership in sustainable tropical forest management Significant constraints are currently hindering further progress toward sustainably managing and conserving Bolivia's biodiversity and tropical forests. These threats include:

- A land and forest policy framework that provides strong incentives for deforestation and weak incentives for sustainable forest management, biodiversity conservation, and forest fire prevention;
- Forestry institutions that are financially insolvent and lack technical capacity;
- Insufficient silvicultural and forest product research to support strengthening of the sector;
- A poorly developed wood products industry; and
- Inadequate valuation of forest environmental services and use of non-timber forest products (NTFPs).

USAID/Bolivia intends that its 2004–2009 Strategic Plan will assist the Government of Bolivia (GOB) to address these constraints effectively.

Principal Recommendations

The Team recommends that USAID/Bolivia maintain its proposed SO **Forest, Water and Biodiversity Resources Managed for Sustained Economic Growth** and support activities in the following four priority areas:

1. Sustainable management of natural forests in the Bolivian lowlands,
2. Improved community and private forest industries,
3. Improved management of protected areas and biological conservation, and
4. Improved livelihoods of rural communities through sustainable management of natural resources.

In addition, the Mission should consider the development of a crosscutting environmental communication and education program in support of the priority areas. Close collaboration between the Environment, Health, Economic Opportunities, and Alternative Development SOs will allow elements of SO4 to be built into the design of activities within the other Strategic Objectives. Specific recommendations for such collaboration is presented in Appendix E.

Status of Forest Management

The area of public forest assigned to the industrial timber industry has fallen from over 21 million hectares in 1996 to less than five million in 2002. By contrast, the area of public forest under the control of indigenous groups, local people, and private owners has the potential to grow to over four million hectares. The decline in the area of forest under timber industry control has resulted from:

- A lack of financial capacity of some timber product companies to pay the US $1.00 per hectare per year fee required under Law 1700;
- The decision by the timber industry to return areas of forest where logging had already occurred back to the national government;
- Bolivia's lack of competitiveness in international wood product markets; and
- Insecurity of rights over forest resources due to the constitutional separation of rights to forest resources from the rights to the land itself and the resulting menace of uncontrollable invasion of concessions by colonists.

The growth in the area of forest controlled by the *Tierra Communitaria de Origen* (TCOs), *Agrupacion Social del Lugar* (ASLs) and private owners reflects:

- The assignation of land title to the TCOs gives an incentive for indigenous groups to request the largest area they can reasonably claim.
- The assignation of municipal forests to the ASLs is politically popular and brings illegal exploiters of forest resources into the legal system of forest exploitation.
- TCOs and ASLs pay lower fees for forest exploitation than industrial concessions do.

The shift from industrial control over forestland to control by indigenous groups, local people and private landowners has financial and ecological implications. The decline in the area of industrial concessions has reduced the income from the fees for forest exploitation, since industrial concessions are required to pay US $1.00 per hectare per year. The TCOs and ASLs are required to pay the national government US $0.30 per hectare on only the area logged each year. The income from the forest fee is much less than was planned for and the institutions that receive funds from the fee are not receiving sufficient funding to carry out their responsibilities.

As a consequence of the shift in control over the forest from large industrial concessions to many smaller TCOs and ASLs, community forestry development projects take on an enhanced importance in lowland Bolivia. Whereas previously the focus of forest management could be on the technical aspects of the production of forest products, now the focus has shifted to the organizational aspects of managing forests with the participation of the members of communities. Community forestry projects have the objective of

improving the social, economic and emotional conditions of the rural communities, based on their own perspectives and interests, while at the same time promoting sustainable management of all natural resources found in the forest.

Biodiversity Endowment

Bolivia has a rich biodiversity endowment as a result of the wide variation on altitude within the country. This creates a great range of ecological conditions that produce a wide variety of vegetation types and ecosystems. The lowland forests are particularly rich in biodiversity, and despite serious threats from agricultural colonization, road development and wildfire, contain a wide range of plant and animal species. Highland areas and aquatic systems contain rare and endangered species that are also under threat in many cases.

Status of Protected Areas

Under the Environmental Law No. 1333 approved in 1997, parks and protected areas were organized into the *Sistema Nacional de Areas Protegidas (SNAP).* The *Servicio Nacional de Areas Protegidas (SERNAP)* was established to monitor, control and develop this system of parks and protected area. SNAP manages 19 protected areas and parks and plans to incorporate two more. These areas cover about 16 percent of the country. With no income of its own, SERNAP can do very little to manage the protected areas and consequently, many of them are being invaded. Tourism to the protected areas has dropped due to lack of infrastructure and poor security.

Prefecturas and *Municipalidades* have defined approximately 20 additional protected sites. Nongovernmental organizations (NGOs) also protect a number of other areas outside of SNAP. These areas include biological resources not represented in the SNAP, and therefore protect rare plant and animal species. Management committees have been organized to encourage wider participation in the management of some protected areas. In others, the responsibility for park administration is shared with indigenous groups, e.g., Gurani-Izoceño in Kaa Iya National Park and Trinitario in Isiboro Secure.

Recognizing the importance of NTFPs, many local NGOs and indigenous groups working and living in and around protected areas are interested in managing wildlife and exotic plants for profit and have initiated studies to promote this activity. A biocommerce strategy is also under consideration, but unfortunately, laws governing the management and harvest of these resources are complex and contradictory. As a result, illegal traffic in wildlife and plant species persists, preventing licit development of these high potential development opportunities.

Ecotourism has the potential to add economic value to the protected areas and provide jobs for surrounding communities. The main factors preventing the growth of this important economic opportunity are poor roads, poor infrastructure, weak institutions, and a general lack of knowledge and awareness among Bolivians and foreigners of the amazing beauty and wealth of Bolivia's natural resources. Developing Bolivia's competitive edge in ecotourism will require investment in product development, human resources and basic infrastructure. In terms of the international ecotourism market, Bolivia is still undiscovered and underdeveloped. For the most part its products are unknown. Therefore, if Bolivia is to penetrate the world marketplace it is critical that a marketing program be established and a quality sustainable product offered.

Status of the Forest Industry

The forest products industry contributes approximately US $220 million or three percent of the GNP. In terms of employment, this sector is directly responsible for approximately 90,000 jobs and indirectly

responsible for an additional 150,000 jobs. In 2001, there was an unprecedented 61 percent increase in certified forest product exports, attributed to a rise in certification of forest concessions in Santa Cruz and marked success of medium-sized private companies exporting garden furniture to the United States.

With the exception of Brazil nuts and furniture, forest exports have declined and forest products enterprises continue to slide. Markets are elusive, and production costs continue to rise, making most Bolivian wood products uncompetitive in foreign markets. It is sometimes cheaper to bring wood from Brazil than to harvest it in Bolivia. A variety of problems, including lack of financing, poor infrastructure, transportation (as much as 60 percent of production costs), corruption and poor business practices are often mentioned as obstacles to growth. Potential investors cite land tenure problems and insecurity as the principal deterrents to their investment.

Priority Areas for USAID/Bolivia Support, 2004-2009

The Team recommends four priority work areas for USAID/Bolivia support to Bolivia's environmental sector. Successful completion of the expected results proposed in each area would significantly contribute to USAID/Bolivia's overall development objectives detailed in the Strategic Plan.

Priority 1: Sustainable management of natural forests in the Bolivian lowlands. The following expected results should be pursued:

- *Forestry incentives provided by national policy.* Disincentives for forest management must be removed if sustainable forest management is to be adopted on a widespread basis in the Bolivian lowlands. It is recommended that USAID finance, through public institutions and private NGOs, policy studies aimed at drafting legislation, regulations, and communication strategies that would result in national policies that provide incentives for forest management. Technical support could be provided from US institutions with experience in defining and implementing forestry incentives within a forest policy framework.
- *Key forest management institutions must function effectively and collaboratively.* In short, this means that institutions related to forests effectively carry out their responsibilities for making forests a competitive land use. Given that in Bolivia all forest resources belong to the State, public institutions play an important role in helping forest management successfully compete with agriculture and pasture. Under this expected result, it is suggested that USAID provide support to municipal governments to specifically help them promote the establishment of ASLs. Financial support to the Forest Superintendence is also needed to provide regulatory oversight for management of the TCOs and ASLs.

Priority 2: Improved community and private forest industries. To improve the efficiency and profitability of the industry, investments need to be made at all points of the value chain, with immediate attention given to the weakest links in the chain. The expected results include:

- *Improved Trade and Marketing*. Utilization and marketing of lesser-known species (LKS) on a commercial scale remains the most persistent obstacle to forest product development and sustainable forest management of these diverse tropical forest ecosystems. A wealth of existing research on mechanical properties and woodworking characteristics of LKS is available and needs to be synthesized for the Bolivian situation. Participation in trade associations, product fairs, and international trade associations is already in place with *Centro Amazonico de Desarrollo Forestal* (CADEFOR) and the Forestry Chamber of Bolivia working collaboratively to promote the industry and secure financing.

- *Research and Development on Appropriate Technologies.* Improving wood processing efficiency through improvements in kiln drying, material handling and waste recovery in harvesting and production is the first step to improving yield. Companies need to upgrade equipment to current manufacturing standards. With limited resources, this can be difficult, therefore a balance of investment strategies and appropriate technologies must be found. For smaller producers, a flexible manufacturing network is a feasible option. Shared resources, equipment and information allows outsourcing to kiln facilities or other processing machinery on an as-needed or contract basis as an alternative to large-scale investments and helps fill orders for primary or secondary materials.
- *Development of entrepreneurial skills and better business practices*. In addition to capital investments, administrative, human resources, and operational investments are necessary. Transparent and auditable bookkeeping following accepted international standards is required to improve credit ratings and access to capital. Improved training and inventory programs designed for the forest product sector will reduce stock and cash flow and facilitate just-in-time (JIT) manufacturing and delivery. Business forums and workshops will help demonstrate acceptable norms and tolerance for the international market. Rapid turnaround on inquiries and follow-up is critical for customer service and development of a client base. Development of sales departments, sales representatives or sales offices overseas will expand as demand is created in the marketplace.

Priority 3: Improved management of protected areas and biological conservation. The Team recommends the following expected results and actions:

- *Long-term financing and institutional capacity for management of protected areas strengthened*. Negotiations should continue to generate funding from international agencies concerned with biodiversity conservation, while other funding mechanisms are initiated, including charging entrance fees and user fees, and pricing environmental services offered by parks. Sport hunting, limited logging, harvesting of NTFPs, and water rights are all environmental services that can be used to generate income for the protected areas. Infrastructure, visitor services and security should be improved in parks to justify both fees and international investment. Management plans, including communication strategies, should be updated or completed. Park workforce should be trained and adequately paid. In particular, training is needed in participatory planning, buffer zone management, conflict resolution, interpretive services and community interaction, and education. Resolution of land tenure problems is necessary to protect the stability of park and protect area boundaries. Improved participation of park inhabitants in the management of the protected area is one way of dealing with land tenure problems.
- *Local organization support of protected area management*: Benefits to communities should be determined and communicated to motivate community participation. Local organizations can benefit from the development of sustainable tourism opportunities and training of park personnel. Private sector concessions can generate both local employment and operating funds for protected areas. Development of educational materials and products for sale to visitors will help operate the protected areas. Community education programs brought by park staff to schools and other gatherings will develop good public relations and increased awareness and support.
- *Legal and institutional framework strengthened*: Protected areas not under the administration of SERNAP could be organized into regional divisions managed by municipal associations or *prefecturas.* Regional offices could coordinate with local organizations to improve administration and minimize costs. Increased representation of ecological zones within protected areas would be another benefit of decentralized, regional protection programs. Coordinating committees already in place in some areas should receive technical assistance in policy, planning, administration and others from SERNAP. SERNAP could sell these services to support its budgetary needs. Promoting the management of wildlife would help control uncontrolled hunting and the illegal trade of wildlife and

also produce income and employment through sport fishing and hunting fees, sustainable tourism (bird watching and wildlife viewing), and legal export of economically important species and their products. But for this to happen, new laws may be needed. NTFPs, such as medicinal herbs and fibers, are abundant and could be managed for profit. On the other hand, little is known of these products, and like wildlife, they cannot be managed without improved knowledge.

Priority 4: Improved livelihoods of rural communities through sustainable management of natural resources. Community forestry seeks to improve the livelihood of rural communities through sustainable management of natural resources. USAID/Bolivia should lead a process in which the following expected results are generated:

- *NGOs, public institutions and indigenous organizations execute participatory forestry extension programs*: The sustainability of community forestry activities could be improved if local institutions, not donor-financed projects, conduct their own participatory extension programs. To effectively run these programs, these entities would have to be strengthened in a number areas: participatory development policies; participatory analysis and planning; conflict management; the elaboration, negotiation and execution of community forestry projects; and the design and implementation of improved agriculture production and forest development systems.
- *Communities manage natural resources for social, economic and environmental benefits*: Participatory extension programs would work to strengthen the development capacities of the communities. Although situations will differ greatly from community to community, generally tasks included in community forestry projects include land tenure, design, execution, and evaluation of integrated management plans, negotiations and conflict management, business and marketing skills development and farmer-to-farmer training programs.
- *Participatory methodologies and productive technologies improved*: By improving the participatory methodologies and productive technologies used, the social, economical and environmental benefits generated by community forestry programs would be increased. For example, forest management plans and monitoring and evaluations systems could be altered to better consider the rights, needs and roles of women in the planning and execution of development activities. New technologies could also be developed to help communities meet specific needs of food security and health.

Based on the stakeholder's support of community forestry efforts, the ARD Team recommends that USAID be directly involved in the design, negotiation and implementation of new community forestry efforts in both the highlands and the lowlands. However, before this happens, it would be wise to analyze the results and lessons learned with past projects. The UN Food and Agriculture Organization (FAO), COSUDE, CARE, Wildlife Conservation Society (WCS), and World Wildlife Foundation (WWF) all have experience in implementing community forestry activities; therefore, it is suggested that USAID collaborate with these organizations to conduct an exercise in systematization of these experiences.

Crosscutting Interventions

Environmental education and communication are essential to the success of all 12 expected results mentioned above. The greatest efforts carried out so far in relation to forest management have been directed to the application of the new Forestry Law, promoting the use of timber by forestry concessions, ASLs, and social associations in TCOs. This has led to the underestimation of the value of NTFPs, with the exception of carbon sinks and Brazil nuts, and to a lack of actions promoting NTFP use. The ARD Team believes that efforts should be made to identify and extract value from environmental services, such as watershed management, carbon sequestration, tourism and NTFPs including wildlife, medicinal herbs and food products. This focus will contribute to ecological and economic sustainability and to a broadening of economic opportunities for communities and user groups.

Finally, the development of systematic and coordinated actions of environmental education and communication will support all of the above priority areas. Forests are very important for Bolivia in terms of biodiversity, conservation of environmental resources at the community and regional level, and because of their recognized economic potential. Unfortunately, the populace neither understands nor actively supports the activities necessary for sustainable forest management and biodiversity conservation. Therefore, it is important that USAID-Bolivia contribute decisively to intensive education and communication campaigns through training, participatory activities, education curricula, and mass media and communicate the value and benefits of sustainable forest management, wildlife and protected areas, and control and prevention of forest fires and deforestation.

External Communication. Increasing collaboration in three areas will greatly enhance the effectiveness of USAID programming: community participation, use of local institutions, and an interdisciplinary approach to project design and implementation.

Programs and activities designed around real rather than perceived or assumed needs, desires, and abilities have a much greater likelihood of success. Designing and implementing *with* rather than *for,* develops ownership, decreases conflict, builds capacity, and ensures long-term sustainability. Communities—the people on the ground that need the programs—should be included in deciding policy, developing area plans, designing technological research and technology transfer programs, and in applying the new methodology. Community participation is a partnership between communities, government, donors, and other stakeholders.

Like community participation, working with and through local agencies and institutions is another method of developing ownership, decreasing conflict, building capacity, and ensuring long-term sustainability of programs. When government agencies are involved in projects, policymakers understand the need for and the context of policies, and are more likely to support programs. Local organizations generally having credibility and trust amongst their countrymen, can be much more effective than a foreign entity or even government officials in implementing programs and interacting with communities. Strengthening the capacity of local institutions through guided practice increases their administrative capabilities, builds technological expertise, and develops a planning approach that can be carried from project to project. Local organizations will be the ones to carry programs forward for widespread adoption.

Integrating Environment into Other Strategic Objectives

This report has identified four priority areas, including expected results and recommended actions, under USAID's SO 4: Forest, Water and Biodiversity Resources Managed for Sustained Economic Growth. Collaboration between all SO Teams and partner institutions is essential for success in each of these priority areas. Participation in addressing SO 4 can assist each SO team in achieving the results identified in their draft Concept Papers.

Several areas of collaboration have been cited in this report and have been presented in tabular form in Appendix E. Crucial areas can be summarized as follows:

- SO1: Democracy—design and training in participatory methodologies and support to networking for sustainable management of natural resources;
- SO2: Economic Growth—improve incentives for forest management, support local non-wood forest enterprises, promote better business practices, and stimulate local and international markets for wood and non-wood forest products;
- SO3: Health—design and implement community health programs in forested areas and design and implement potable water systems in protected areas;

- SO4: Environment—lead the design and implementation of community forestry projects, promote the sustainable management of wildlife and other non-timber forest products, and train in and promote the sustainable management of natural resources;
- SO5: Alternative Development—continue to promote alternative development systems, continue to finance alternative development projects, and promote management of buffer zones to prevent the expansion of coca;
- Title II: Food Security—finance activities in natural resource management and support management of protected areas by rural inhabitants; and
- The Embassy—conduct awareness campaigns for conservation and disseminate participatory development programs financed by USAID.

Communication is a crosscutting and essential component for the completion of all priority programs to promote sustainable forest management and conservation of biodiversity. The overall link between USAID/Bolivia's SO teams and partners is the relationship between Bolivians' natural resource management and the resulting impact on their income and health. The challenge is to empower Bolivians to match land use to land capability in a way that creates tangible, positive and sustainable democratic, economic, social, and health benefits.

All of USAID/Bolivia's SO Teams are involved in communication for technology transfer. A systematized approach to technology transfer would reduce duplication. A system of toolboxes, developed through a participatory process and through formative research, would allow each SO Team to develop a communication toolbox that could be reproduced and implemented by other SO Team partners and projects. Collaborative training would develop skills and strengthen networking and cooperation between projects, reducing duplication and cost.

These toolboxes and communication techniques could be applied by all SO Teams and partners to increase interaction, develop constituency and advocacy for policy, strengthen municipal capacity, increase community participation for local action, utilize mass communication to increase awareness, issue a call to action, and report on progress.

Summary of Recommendations

In summary, this report recommends that USAID/Bolivia maintain its proposed SO, "Forest, Water and Biodiversity Resources Managed for Sustained Economic Growth." In order to work towards this Strategic Objective, this report recommends that the Environmental SO Team establish the following four intermediate results:

- Sustainable tropical forest management,
- Improved community and private forest industries,
- Improved management of protected areas and biodiversity conservation, and
- Improved livelihoods of rural communities through sustainable management of natural resources.

Additionally, the Team recommends that the Environmental SO Team establish an environmental communication and education program that supports the achievement of these results.

1.0 Introduction

Sections 118 "Tropical Forests" and 119 "Endangered Species" of the 1986 Amendments to the Foreign Assistance Act (FAA) require each USAID Mission, as part of the preparation of its five-year Strategic Plan, to:

- Define actions necessary in the country to achieve sustainable management of tropical forests and conservation of biological diversity, and
- Determine the extent to which the actions proposed for support by the USAID meet the needs thus identified.

The report is intended to comply with these requirements. It contains the following eight sections:

- Section 1 presents the objectives of the study, the methodologies used and summarizes the content of each of the report's nine sections.
- Section 2 provides an overview of Bolivia's physiography, biodiversity and forests, demographics, political structures, economy, and environmental institutions and legislation.
- Section 3 addresses the management of Bolivia's tropical forests, summarizing the principal characteristics of the Permanent Production Forest, the 1996 Forestry Law, and the major issues affecting Bolivia's tropical forests.
- Section 4 describes the forest products industry, first reviewing Bolivia's forest resources, types of forest product industries, certification of forest products and then analyzing the opportunities for strengthening the sector.
- Section 5 addresses the conservation of biological diversity in Bolivia, including a description of the nation's biodiversity and protected areas, and an analysis of the threats to their conservation and opportunities for promoting their protection.
- Section 6 describes past and current community forestry programs in Bolivia, focusing on the three community forestry projects that are currently supported by USAID, and makes recommendations for continuing support to community forestry projects.
- Section 7 discusses environmental education and communication programs, emphasizing how participatory environmental education and communication programs can change human behavior in ways that result in environmental protection.
- Section 8 presents, in the form of a Results Framework, the Team's recommendations for four priority areas for USAID/Bolivia action related to tropical forests and biodiversity.
- Section 9 stresses that collaboration between USAID/Bolivia's Strategic Objectives (SOs) Teams will be required in order to obtain the results contained in the four priority areas recommended by the ARD Team for the Results Framework of the Environmental Strategic Objective.

The report was prepared by a multidisciplinary team of local and international experts in the fields of tropical forest management, community forestry, wood product marketing, environmental education and communication and mapping. The Team biodata is given **Appendix A**. The Team first reviewed relevant reports and interviewed local experts in Bolivian tropical forest management and biodiversity conservation. References and the List of Contacts are found in **Appendixes B** and **C**, respectively. Two workshops were conducted in La Paz and one workshop in Santa Cruz, with total of 75 experts in tropical forest management and biodiversity. During these workshops the Team received the participants' perceptions of the threats to Bolivian tropical forests and biodiversity and the opportunities for reducing those threats. For more on the information generated in these workshops see **Appendix D**. Based on these sources of information, the Team consolidated its recommendations to USAID/Bolivia for priority actions to conserve Bolivia's tropical forests and biodiversity in the form of a

Results Framework. The proposed Results Framework was presented and discussed in a final meeting with representatives of the USAID/Bolivia Strategic Objective Teams for health, economic opportunities, alternative development and environment. Recommendations for internal and external collaborative programs are given in **Appendix E**.

2.0 Country Overview

2.1 Physiography and Climate

Bolivia is a landlocked country in the center of South America with an area of 1,098,581 square kilometers. Topography ranges from over 5000 meters above sea level in the rugged highlands of the Andes Mountains, to Inter-Andean Valleys to the plains of the Amazonian and Chacoan lowlands less than 500 meters above sea level. Bolivia's varied topography produces wide variations in temperature and rainfall, from the low temperatures and dry climate of the highlands, to the hot temperatures and high rainfall of the lowlands. About 70 percent of the country is less than 500 meters above sea level in the eastern lowlands. The major rivers drain north into the Amazon basin, east and southeast into the La Plata basin, and into closed lakes or salt lakes within the Andean highlands.

2.2 Biodiversity

Bolivia is a 'mega-diverse' country, ranking eighth in the world in terms of species richness and ecological diversity. Its territory includes four major biomes: forests (50%), high Andean grassland plains (30%), savannas (20%) and wetlands (1%). These biomes include 14 ecoregions and 199 ecosystems. Map 1 depicts the ecological region identified in the National Biodiversity Strategy. Lowland ecoregions, such as the Southwest Amazonian humid forest or the *Chiquitano* dry forest, are especially high in species diversity while montane forests and savannas are centers for species endemism. Biological inventories indicate that Bolivia has 20,000 species of plants, 325 species of mammals, 1379 species of birds, 260 species of reptiles, 186 species of amphibians and 550 species of fish. Although there are probably a large number of invertebrate species, this group of organism has not been well studied.

About 339 species of vertebrates (96 manuals, 156 birds, 20 reptiles, 3 amphibians and 64 fish) are threatened. So far, however, only two known vertebrate species have become extinct: the high plains *chinchilla* and a Lake Titicaca fish. Less is known about the threatened status of plant species, but rare or endemic orchids and cacti are banned from international trade (CITES Appendices I and II).[1]

2.3 Population

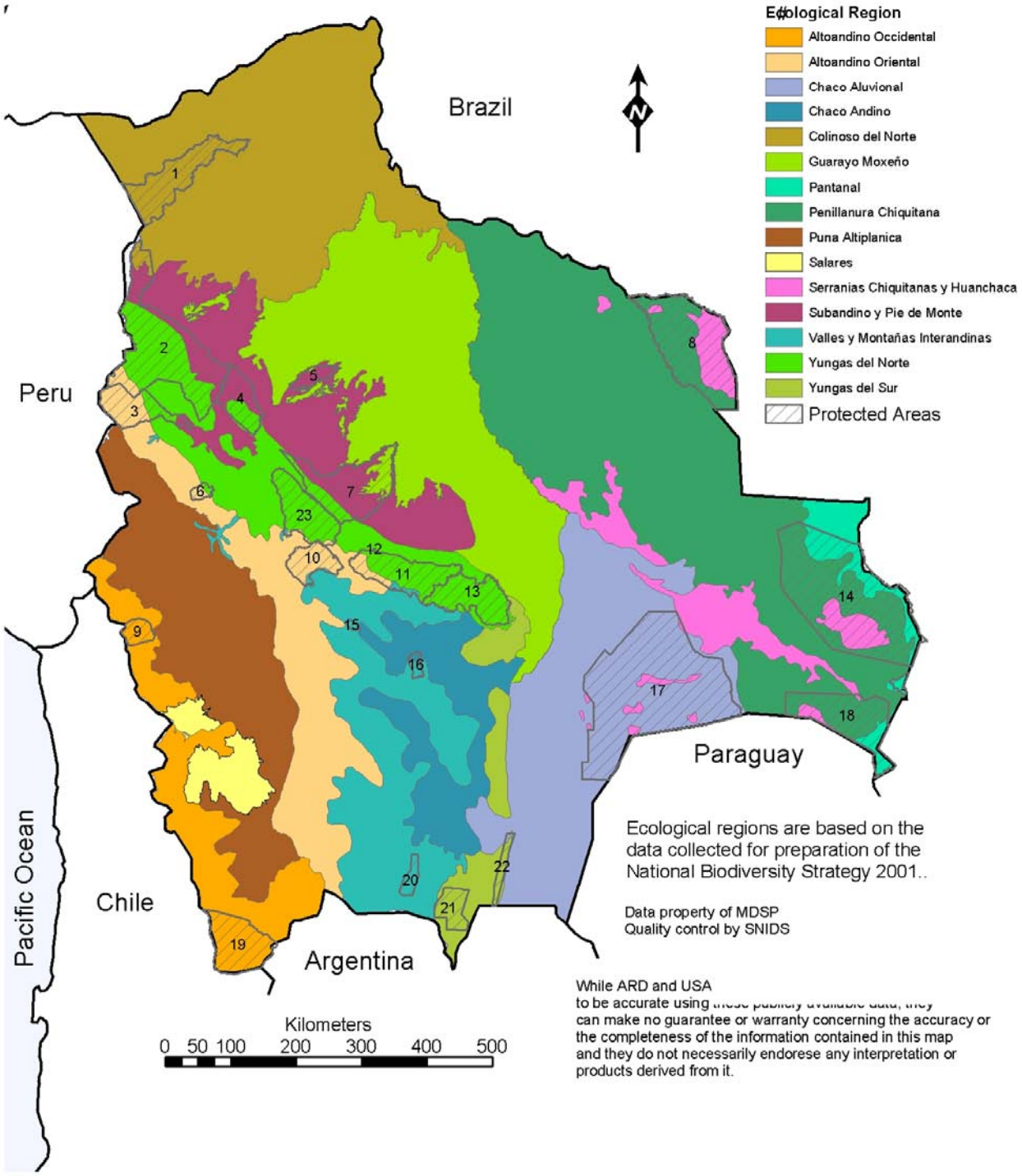
Bolivia's population of 8.3 million is relatively small compared to similar-sized countries in South America. The population growth rate between 1990 and 2000 was about 2.37 percent per year. The urban population rose from 41 to 63 percent of the total population between the mid-1970s and the late 1990s. The lowland's percentage of the population grew from 25 to 32 percent during the same period.[2] Bolivia is diverse ethnically, with approximately 40 ethnic groups (five in the highlands and about 35 in the lowlands). The indigenous population embraces 14 linguistic families, of which three are in the highlands and 11 in the lowlands. In addition to the indigenous population, a minority of Bolivians is of mixed descent. The two largest highland ethnic groups are the Quechua and Aymara. About 40 percent of rural Bolivians are illiterate.

2.4 Democracy and Governance

After many years of military rule, Bolivia returned to democracy in 1986 and since then presidential elections have taken place regularly every five years. In 2002, the central-right political tendency narrowly won the presidency. The new government's principal policies include coca eradication, export promotion, control of corruption, poverty alleviation and generation of employment through public infrastructure projects.

1 Saramento, J. et al 1998. Plan de acción para los especies amenazadas de Bolivia. Museo de Historia Natural, La Paz.
2 Pacheco, P. 2001. page 7.

Map 1. Ecological Regions in Bolivia



The national government is negotiating with bilateral and multilateral donors to help finance the implementation of these policies. International agreements on sustainable management, biodiversity and trade will most certainly continued to be honored.

Bolivia is divided into nine departments, each with a *Prefectura* representing the central government. Bolivia is currently decentralizing by transferring many government responsibilities to the departmental and municipal level and seeking the participation of a wider range of social groups in decision making. Bolivia's 314 municipalities have been assigned responsibilities for land use planning and forestry as part of this decentralization process.

2.5 Economy

Bolivia is one of South America's poorest and most indebted countries. Fifty-eight percent of the population remains under the poverty line and in 2000, gross income per capita was US $980. Seventy percent of the urban population and 94 percent of the rural population were classified as poor in 1992. Life expectancy is 61 years and is the lowest among the South America countries.

After a severe economic crisis in the early 1980s, the Bolivian government implemented a comprehensive, orthodox structural adjustment program in 1985. Although there is still debate about the effectiveness of this program on alleviation of poverty, in the 1990s the gross domestic product (GDP) grew by 3.9 percent per year, in part due to increased investment and exports. In the late 1990s, drops in the international prices of raw materials created another crisis in the mining, agriculture and manufacturing sectors and the growth rate slowed to less than two percent.

In 2000, Bolivia's GDP was US $8.2 billion and its external debt of US $6.8 billion. The value of its exports in 2000 was US $1.23 billion, including US $166 million in hydrocarbons and gas, US $76 million in tin, and US $58 million in manufactured goods. The value of imports was US $1.8 billion, including $333 million in food, $903 million in energy and $594 million in capital goods. Inflation has decreased in Bolivia from 13 percent in 1995 to approximately 3.4 percent in 2000. Bolivia's economic sectors are distributed between 62 percent services, 22 percent agriculture, 15 percent industry, and 13 percent manufacturing. Eighty-three percent of the workforce is employed in the informal sector, meaning they neither pay taxes nor receive social benefits.[3]

High transportation costs significantly retard Bolivia's economic growth. A rugged geography makes transport difficult and, with the exception of a few main tarmac highways, most locations are accessible only by poorly maintained dirt roads. Bolivia's landlocked position makes its products difficult and expensive to ship to international markets although access to the Atlantic Ocean is possible by river down the Amazon and Río de la Platte tributaries.

2.6 Land Tenure

Bolivia's land tenure is divided into state-owned, private and communal property. Indigenous groups' claim on land falls into the communal property category. Large tracts of land in the tropical lowland regions of Bolivia (Beni and Santa Cruz) are owned by affluent cattle ranchers and, especially in Santa Cruz, by agro-industrial firms and wealthy agriculturists. Land tenure in the valleys and mountainous regions of Bolivia has a different pattern, with mainly small properties devoted to subsistence farming and livestock. Insecurity of land tenure threatens the sustainable management of forests and biodiversity by discouraging investment in sustainable land uses and causing intractable conflicts between stakeholders.

The 1996 "*Ley del Servicio Nacional de Reforma Agraria*" established the Institute for Agrarian Reform (INRA). It is responsible for regulating land distribution, enforcing constitutional guarantees over private

[3] World Bank Group, Bolivia at a Glance, 2000.

property and establishing processes for resolving conflicts over land tenure. It also created the *Superintendencia Agaria,* and *Judicatura Agraria*. The *Judicatura Agraria* has jurisdiction to "…resolve conflicts or the possession and rights of agricultural properties…"

The *Superintendencia Agraria* has responsibility for regulating and controlling harmonious use of natural resources under sustainable development principles and executing expropriation procedures in combination with other governmental organizations that protect and conserve the biological diversity in Bolivia. After certification from the *Superintendencia Agraria*, *tierras fiscales* can be transferred to municipalities and indigenous groups. In 2003, INRA has plans to redistribute to communities and landless people about 500,000 hectares in the eastern lowlands, many of which are probably forested.

2.7 Environmental Legislation and Institutions

2.7.1 Environment Law 1333

The 1992 Environmental Law No. 1333 established and organized the *Sistema Nacional de Areas Protegidas* (SNAP). Soon after, SERNAP was established to monitor, control and develop this system of parks and protected areas. The law states that all Bolivian environmental policies should improve Bolivian livelihoods. It promotes integrated management of forestry and agricultural lands as a means to protect and conserve their productivity. It stresses the importance of not overgrazing and destroying the highlands. This law also establishes a framework for regulating mining, oil and gas production, and for preparing environmental assessments. [4]

2.7.2 Biodiversity Laws and Regulations

Attempts to pass national legislation that would legally protect biodiversity have so far not succeeded due to lack of sufficient support in the Congress. In an attempt to compensate for the lack of a biodiversity law, several ministries have issued decrees to protect biodiversity. These decrees, however, have not been enforced. For example, the Ministry of Sustainable Development and Planning has banned commercial hunting and wildlife trade but these activities continue unchecked.[5]

2.7.3 Forestry Law 1700

Forestry Law No. 1700, approved in 1996, regulates the sustainable use and protection of forests and forested lands. It aims to produce benefits for future generations while balancing socioeconomic and environmental needs of the nation. The law promotes the sustainable management of forests through design and implementation of forest management plans and deforestation permits. The *Superintendencia Forestal* was created to analyze, approve, and monitor the implementation of forest management plans. This law also makes municipalities responsible for the development of forests within their jurisdiction and permits private individuals, companies, organized colonists, and indigenous groups to obtain forest concessions. The law was instrumental in enhancing the participation of colonists and indigenous groups in forestry development.[6] The Forestry Law is discussed in more detail in Section 3.

2.7.4 Wildlife Legislation

Bolivia does not have specific legislation regarding wildlife but has established a number of regulations, some overlapping and conflicting, to protect wildlife. The authorities responsible for enforcing these regulations, however, lack sufficient information and training to make correct technical decisions about quotas or wildlife

[4] Andaluz A., 1998.
[5] D. Rumiz, personal communication.
[6] BOLFOR *Nueva Ley Forestal*, 1997.

recuperation strategies. In 1993 the *Ministerio de Desarrollo Sostenible y de Planificación* was given responsibility for the protection and management of wildlife. The Ministry's national wildlife conservation program emphasizes the involvement of local people in wildlife conservation measures that produce income. This program, however, has not been implemented.

2.7.5 Environmental Education and Communication Laws and Regulations

The 1992 Environment Law charges State institutions, in coordination with public and private sector educational institutions, with establishing policies and strategies for formal and non-formal environmental education. It establishes that autonomous and private universities should focus their academic, technical and professional formation programs on conservation and sustainable development. It also states that communication media should promote and facilitate education and information actions. The Environmental Management Regulation (1995), Popular Participation Law (1994) and Forestry Law (1996), all identify as rights of citizens and community organizations the right to information, to formulate petitions and complaints and to participate in actions related to environmental management and sustainable development.

The Education Reform Law (1994) establishes the promotion of respect for nature, development of a conscience for the defense and sustainable management of natural resources, and the preservation of the environment as one of the purposes of Bolivian education. Furthermore, environment is one of the four crosscutting themes in the pedagogic and curriculum proposals of the Education Reform.

Between 1994 and 1997 the Subsecretariat for Environmental Promotion of the Ministry of Sustainable Development and the Environment was created, and produced a document outlining education policies for sustainable development, which coordinated some education actions with the Education Reform and other nongovernmental organizations (NGOs). However, an environmental education strategy, which would have enabled effective information and awareness raising of the Bolivian population, was not formulated during this time. At present there is no State organization responsible for the promotion and coordination of environmental education and communication activities.

SERNAP and the General Biodiversity Directorate have established policies and programs for training, environmental education and communication as part of their strategies. They consider participation as a key instrument for consultation, design and implementation processes. However, SERNAP does not have a specific environmental education and communication unit, and these activities are carried out with scant resources and answering only some priority themes and audiences, such as training for protected area management committee members. There has been little training for natural and cultural history interpretation, parks have neither education and interpretation plans nor sign plans and design guidelines, and few facilities such as visitor centers and signed trails.

3.0 Status and Management of Forest Resources

3.1 Description of the Permanent Production Forest in Northern Lowland Bolivia

Bolivia's Permanent Production Forest includes 41.2 million hectares, of which 28.8 million hectares occur in northern lowland Bolivia and 12.4 million hectares in the southern lowlands and mountains. Map 3.1 shows the principal forest regions included in the Permanent Production Forest. Table 3.1 indicates their area, location, and number of common and infrequent tree species and typical volume of commercial wood per hectare.

Table 3.1. Bolivian Permanent Production Forest

Production Region	Area (million ha)	Description	Location by Department	# common tree species	# infrequent tree species	Vol./ha cubic meters
Bajo Paraguá	3.8	Evergreen transitional forest on sites that are not inundated between 150 and 300 masl.	Northern Santa Cruz and southeast Beni	36	210	110
Chiquitanía	6.3	Subhumid semideciduous forest on the precambian shield 200 to 1200 masl.	Northeast Santa Cruz	71	169	84
Choré	1.6	Humid Amazon evergreen forest on inundated sites < 500 masl.	Northwest Santa Cruz	73	158	40
Guarayos	4.2	Amazon evergreen forest on inundated sites <500 masl	Northcentral Santa Cruz	61	220	47
Preadndino-amazónico	4.1	Amazon evergreen forest on inundated sites <500 masl	Southern Beni and Northern La Paz	73	230	89
Amazonia	8.8	Amazon evergreen forest on non-inundated sites <500 masl	Northern Pando	67	216	115
Southern lowlands and mountains	12.4	Chaco dry forest	Southern Santa Cruz and Tarija	n.a.	n.a.	n.a.
TOTAL	41.2					

Source: Adapted from Potencial de los bosques naturales de olivia para produccion forestal permanente.

3.2 Assessment of the Economic Importance of Bolivian Forests

A detailed, quantitative assessment of the overall economic value of Bolivia forests is beyond the scope of this report. In general terms, however, it is accurate to say that Bolivian forests do provide significant market and non-market goods and services. Bolivia's production of hydroelectric power, for example, depends on an abundant, dependable and clean flow of water, some of which flows from forested areas. Similarly, tropical forests in suitable locations attract birdwatchers and other tourists interested in nature. Bolivia's forests also provide non-commercial forest products with economic importance such as medicinal plants, food, tannins, fuel, thatching, canoe wood, construction timbers, and fibers. Forests support wildlife populations that provide food for indigenous and non-indigenous populations.

The principal commercial forest products are Brazil nuts, *palmito*, rubber and wood. Brazil nuts, for example, earn Bolivia about US $30 million a year and provide the main economic support for the towns of Cobija in Pando and Riberalta in Beni, involving about 22,300 people in their collection and processing.[7] Wild palm heart

[7] Helbingen, Alan J. B., 2001.

earned US $3 million in 2001. Although the market for Bolivian wild rubber almost completely disappeared in the 1980s, for over a century rubber tapping was the principal economic activity in Pando and Beni. If market demand were to increase, wild rubber production might again become an important forest product. Some forest plants and trees have medicinal value, such as *uña de gato* and *sangre de drago.* Approximately 50 other native plants are domesticated and provide crops of edible roots, grains, fruits and leaves sold in local markets.[8]

Although wood has been an important local and regional commercial product of Bolivia's forests for centuries, the construction in 1953 of a road from Cochabamba to Santa Cruz stimulated the development of a wood industry that utilized wood from the conversion of forestland to agricultural and pasture use. In the 1970s, as mahogany became less abundant in other countries, Bolivia became an important producer. As commercial-size mahogany became less abundant at the end of the 1990s, the logging and primary processing industry has shifted its attention to a wider range of tree species. Still the majority of the commercial wood cut in the Bolivian forests is concentrated on only about 20 species.

The forest and wood industries sector contributes between two and three percent of the gross national product (GNP) generating 90,000 jobs and accounting for 11 percent of exports.[9] Wood exports reached approximately US $119 million in 2000, dropped to US $100 million in 2001, and have continued their downward trend in 2002 by approximately 20 percent. Despite this overall decline, the exportation of sawn-wood manufactured wood products, mainly furniture, has risen. Argentina, until recently, was an important market for Bolivian construction wood; its recent economic crisis has severely curtailed demand. Exports to other Andean countries have risen due to tariff reductions. About half of Bolivia's forest products industries have become bankrupt since 1996.

3.3 Existing Management Structures

Before 1997, the provisions of the General Forestry Law of 1974 applied to the management of Bolivia's lowland forest. The 1974 Forestry Law in theory "…established a structure and organization for the Bolivian forest service that was in many ways excellent."[10] In practice, however, the CDF never received an adequate budget and so could not adequately implement the forestry law. Its very low salaries encouraged widespread corruption. Other weak points of the 1974 General Forestry Law included:

- inequitable distribution of forest resources due to administrative assignation of harvesting areas;
- little incentive for long-term investments in forest management or wood processing facilities due to the short time period of the contracts and legal insecurity; and
- less than optimal income for the national government due to lack of an open bidding process.

Under the 1974 Forestry Law, the National Forest Service (*Centro de Desarrollo Forestal*) administratively assigned areas of lowland forest to primary wood product industries. The length of the contract could be from one to 20 years and the areas assigned were generally between 100,000 and 200,000 hectares. Since Article 136 of the Constitution of Bolivia stipulates that the State owns all forest resources, these contracts were sometimes superimposed on private land and indigenous territories. Although the law required the preparation of forest management plans, in fact these rarely existed and usually only provisional permits authorized timber exploitation. Contract holders made payments to the government on the basis of volume of wood extracted from the forest; prices were fixed by negotiation not by open competition. Logging was highly selective, concentrated on large-diameter, high-quality mahogany trees.

[8] A. Hesse, personal communication. Mr. Hesse has directed a macaw conservation project in Bolivia since 1993 and is currently consulting on wildlife conservation for the WCS Kaa Iya National Park program.

[9] Poo, Doug et al. 2002.

[10] ibid, p.8.

In 1996, after four years of a consensus-building process and with the technical support of the BOLFOR project, a new forestry law, Law 1700, was approved by the national government. The provisions of Law 1700 assign the right to forest exploitation to the landowner of private property; require payment for harvesting on government lands by area rather than volume; assign priority for assignation of public forest land to social groups rather than timber industry; make state forestry institutions more accountable to the public; assign 20 percent of the public forest areas to municipal governments as forest reserves; and require a technically sound forest management plan for areas over 200 hectares.[11] The law also provides for a process of international auction of concessions through which the market price per hectare per year would be established. Due to political opposition, however, no such auction has ever taken place. Consequently, the arbitrarily fixed price of US $1.00 per hectare per year has remained as the cost per hectares per year of the industrial concessions.

Law 1700 establishes three national forestry institutions. The *Direccion General de Bosques* of the *Ministerio de Desarollo Sostenible y Planificacion* prepares forestry regulations. The *Superintendencia Forestal* enforces these regulations. FONABOSQUE finances forestry investments. The Forestry Law establishes no administrative link between these three institutions. Law 1700 gives departmental governments (*Prefecturas*) responsibility for implementing programs and projects of public investments related to the forestry sector and developing programs for strengthening the municipalities' institutional capacities. Under the law, municipal governments have responsibility for monitoring logging activities and inspecting raw material supply and processing programs. They also assign municipal forest reserves to ASLs. Municipal governments are supposed to create municipal forestry units (UFMs).[12]

Law 1700 classifies forestlands into the following five categories.

- Permanent Forest Production Land: suitable for permanent forestry production.
- Protection Land: utilized for water production, education, research and recreation, not agriculture or timber and includes protective forests within concessions.
- Land Apt for a Variety of Uses: suitable for conversion to agriculture or pasture.
- Rehabilitation Land: severely degraded by deforestation or erosion and, if abandoned, reverts to the state.
- Immobilized Land: pending classification into one of the other categories and can be utilized for timber production.

The 1996 Forestry Law defines the following types of concessions for exploitation of forest products:

- TCOs:[13] TCO concessions correspond to the traditional areas owned by indigenous peoples. Indigenous claims generally receive priority in case of conflict with other claims. TCOs pay a fee of US $0.30 per hectare harvested each year and have no time limit.
- ASLs:[14] ASL concessions are granted to groups of 20 or more rural people who have previously exploited forest resources informally. They are located in municipal forest areas. ASLs pay a fee of US $0.30 per hectare harvested. ASL concessions are for 40 years, renewable every five years.

11 ITTO, 1996.
12 Pacheco, P. 2001.
13 *Territorio Comunitarias de Origen* (TCO).
14 *Agrupacion Social del Lugar* (ASL).

Map 2. Protected Areas and Permanent Production Forest Lands in Bolivia

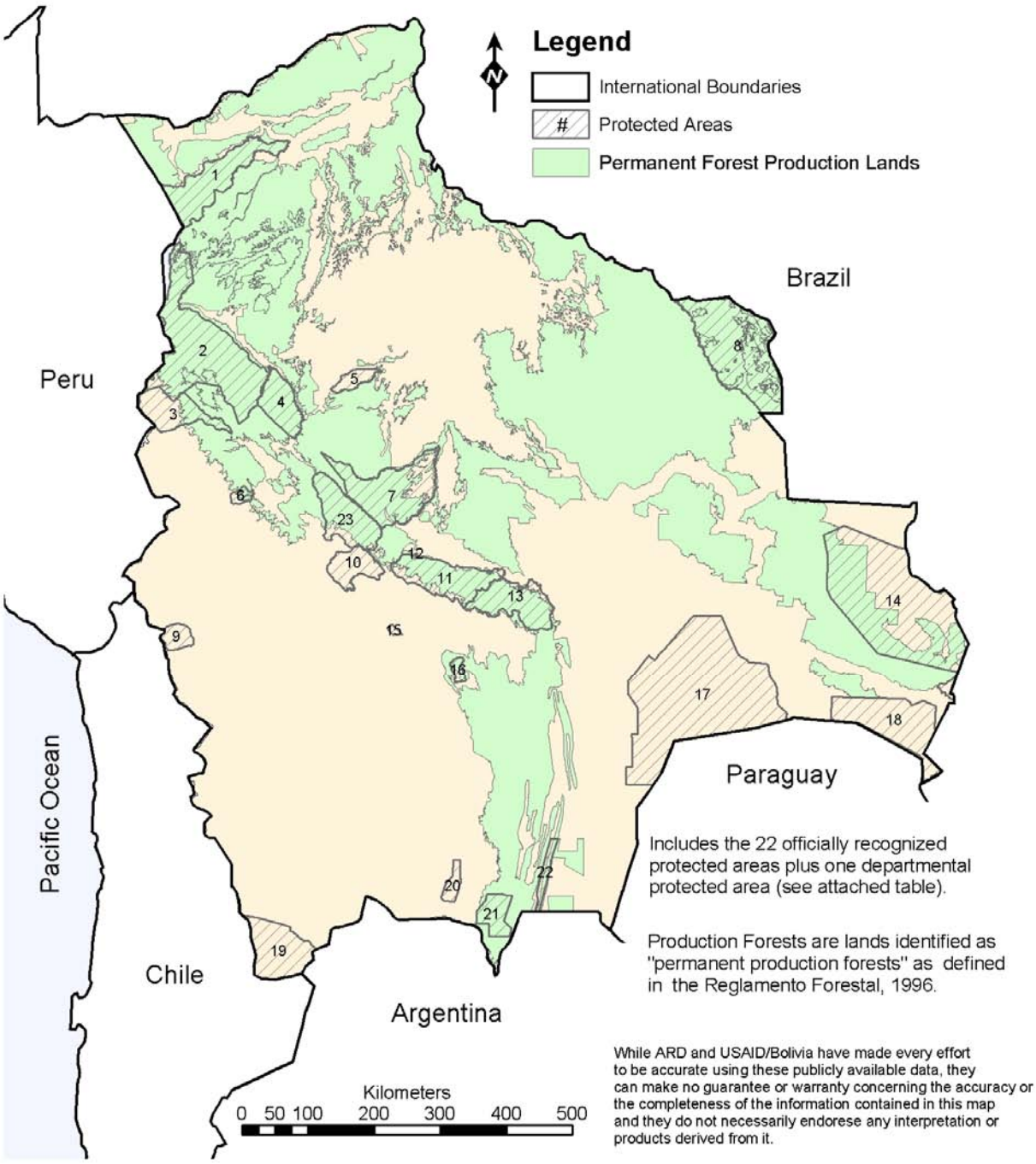


Table 3.2. Protected Areas: Bolivia's Officially Recognized Protected Areas

Code	Name	Category
1	Manuripi	Reserva Nacional de Vida Silvestre Amazónica
2	Madidi	Parque Nacional y Area Natural de Manejo Integrado
3	Apolobamba	Area Natural de Manejo Integado Nacional
4	Pilón Lajas	Reserva de La Biósfera y Territorio Indígena
5	Estación Biológica del Beni	Reserva de la Biósfera
6	Cotapata	Parque Nacional y Area Natural de Manejo Integrado
7	Isiboro Sécure	Parque Nacional y Territorio Indigena
8	Noel Kempff Mercado	Parque Nacional
9	Sajama	Parque Nacional
10	Tunari	Parque Nacional
11	Carrasco	Parque Nacional
12	Cavernas del Repechón	Refugio de Vida Silvestre
13	Amboró	Parque Nacional y Area Natural de Manejo Integrado
14	San Matias	Area Natural de Manejo Integrado
15	Torotoro	Parque Nacional
16	El Palmar	Area Natural de Manejo Integrado
17	Kaa-Iya Del Gran Chaco	Parque Nacional y Area Natural de Manejo Integrado
18	Otuquis	Parque Nacional y Area Natural de Manejo Integrado
19	Eduardo Avaroa	Reserva Nacional de Fauna Andina
20	Cordillera de Sama	Reserva Biológica
21	Tariquia	Reserva Nacional de Flora y Fauna
22	Serrania del Aguaragüe	Parque Nacional y Area Natural de Manejo Integrado
23	Altamachi	Parque Nacional y Area de Manejo Integral Departmental

- Industrial Concessions: Industrial concessions are granted to primary wood product processing industries. The location of these concessions is based on where the industry had contracts for harvesting timber prior to the passage of Law 1700. Industry was permitted to convert all or part of its timber harvesting area to a concession. Industrial concessions pay a yearly fee of US $1 per hectare of concession, excluding the protection areas delimitated by a management plan. The concession is for 40 years, renewable every five years.
- University Research Concessions: University concessions are for the purpose of forestry research and pay no timber-harvesting fee. They are for 40 years.

Industrial concession fees must be paid in January, July and October and are divided between the National Forest Service (30%), departmental government (35%) and municipal government (25%). The deforestation fee is divided between the departmental government (25%), the municipality (25%) and FONABOSQUE (50%). All fines and auction proceeds for confiscated timber/equipment go to FONABOSQUE.

Owners of private properties larger than 200 hectares are required to prepare a management plan and request authorization to harvest forest products (*Autorizaciones de Aprovechamiento*). Properties between five and 200 hectares need only an annual cutting plan. Properties less than five hectares need no permission to harvest timber and pay a fee based on volume of timber harvested. Conversion of land from forest to other uses requires a deforestation permit (*permiso de desmonte*). The fee for deforestation is US $15 per hectare plus 15 percent of the value of the timber harvested during the conversion. Table 3.2 indicates the area of cutting contracts, concessions, and private forest properties within the Permanent Production Forest in 1996, 1997 and 2002.

Table 3.3. Number and Type of Concessions on Government Land in Lowland Bolivia, 1996. 1997, and 2002

Type of Concession/Contract	Area in Millions of Hectares		
	1996	1997	2002
Cutting contracts	21.00	0.37	0.11
Industry Concessions	0	5.50	4.44
University research forests	0.26	0.26	0.26
Local Social Groupings (ASLs)	0	0	0.60
Private Properties of Industry	0	0	0.50
Local Indigenous Territories (TCOs)	0	0	0.80
TOTAL	21.26	5.76	6.43

Source: "Comercio Exterior", No 103, p. 2

A principal purpose of Law 1700 was to introduce technical, organized forest management into Bolivia's lowland tropical forests. In this the law has been successful. Box 1 summarizes the technical regulations governing forest management in lowland Bolivia.

Box 1. Summary of Technical Regulations for Forest Management in Bolivia

Professional Responsibility: Legal accountability of accredited foresters for management documents.

Vegetation Maps: Satellite images and aerial photographs used to classify landscape and forest types and map concession limits and location of sampling units.

Forest inventory in the production area: Estimation of tree species composition and volumes following guidelines that:

- Require sampling intensities between 0.1 percent and 8.
- Use 100 sample plots of 0.1 to 2.0 hectares depending on tree and concession size.
- Sample plots for natural regeneration.
- Identify key vegetation for wildlife populations.
- Identify palm populations.

Minimum cutting diameters: Established by species pending further research.

Management plan:

- Lists harvestable timber species, annual volumes, and cutting cycles.
- Identifies actions to avoid loss of threatened and key wildlife species
- Identifies actions to prevent soil and water degradation.
- Lists medium and large vertebrates occurring in the area, together with their conservation status.
- Establishes ecological reserves where logging is prohibited.
- Utilizes maps showing vegetation cover, administrative divisions, annual cutting areas and ecological reserves.
- Includes a monitoring plan and evaluation plan for identifying forest response to logging and silvicultural treatments.

Source: Prepared by the D. Ruiz based on BOLFOR. 2001.

3.4 USAID and Other Donor Activities in Support of Forest Management

USAID's principal support for forestry in Bolivia in the last decade has been through the BOLFOR project. BOLFOR is a large, multifaceted project; it is beyond the scope of this report to describe or evaluate its activities related to forest management in detail. In brief, BOLFOR started in 1994 with a focus on carrying out forestry research and supporting the technical aspects of natural forest management. It soon also became involved in the technical aspects of the ongoing debate over the content of the new forestry Law. After the passage of the 1996 Forestry Law, BOLFOR focused on assisting large, integrated wood products companies to adjust to the new requirements of the law and to become certified under internationally accepted standards. In its second phase, starting in 1999, BOLFOR shifted its focus away from supporting forest concessions of integrated wood industries to assisting the TCOs and ASLs to establish forest management units that can qualify for

certification.[15] BOLFOR has also supported research on the environmental impacts of forest management practices and on the development of silvicultural practices for the northern lowland forest.[16]

Other donors that have been involved in forestry in Bolivia include the Food and Agricultural Organization (FAO), the German Technical Assistance, the Swedish and Dutch foreign aid programs, the World Bank and the Inter-American Development Bank (IADB). Perhaps the most important internationally financed forestry or forestry-related projects presently being implemented aside from BOLFOR are those financed by the Swedish and Dutch governments and by the IADB. The Netherlands is financing SERNAP with one million dollars per year through 2016. It also finances PROMAB, which does forest research with universities in Cobija and Riberalta and provides financial support to *Fundación Trópico* to improve Bolivia's competitive position in international wood product markets. Finally, the Netherlands is financing a program with INRA focused on clarifying legal rights over forestland. IADB Loan 929 has a forestry subcomponent, which has financed the establishment of capability in the *Dirección General de Bosque* for forest mapping.

3.5 Major Issues in the Management of Bolivian Tropical Forests

3.5.1 Role of Forest Management in Poverty Alleviation in Bolivia

Forest management, defined in its broadest sense, could play a much larger role than it has in the past in alleviating Bolivia's widespread, extreme poverty. Forestry could contribute to poverty alleviation through its contribution of goods and services to both the formal and informal economies and by creating employment for the poorer, less educated sectors of the population.

The formal forestry sector provided less than two percent of GDP during the 1990s, far less than its potential. In part, this low contribution results from lack of production. Less than one million cubic meters of the 20 million cubic meters of wood that grows each year in Bolivia's lowland forest, for example, is harvested and converted into commercial wood products. Likewise, only 40 to 60 percent of the Brazil nut production that fall to the forest floor are actually collected. Although data are not available, the same underproduction may be limiting the contribution to the economy of such forest products and services as wild palm hearts, medicinal plants, and tourism. It is beyond the scope of this report to analyze in detail the factors that limit the contribution of specific forest products and services to the growth of the Bolivian economy and, therefore, to poverty alleviation. But it is clear that the potential exists for the forestry sector to make a much larger contribution to the formal Bolivian economy.

Forestry also could more significantly contribute to poverty alleviation in the informal economy. Agriculture, for example, provides the livelihood of most of the poor colonists who are entering the lowlands. Forestry practices can increase the overall profitability and economic and ecological stability of small, agricultural enterprises. The conversion of forests to nutrients through slash and burn agricultural practices, for example, makes food production possible on nutrient poor soils. Forests also provide rural households with products such as wild game, medicinal plants, building materials and fibers. Even non-commercial forest products and services of this sort contribute to the overall success of agricultural enterprises. Forestry, by improving the productivity and quality of such products and services through management practices such as controlled burning, incorporation of nitrogen-fixing trees into the farm system, and practices that stimulate adequate regeneration of harvested species, can, therefore, contribute to poverty alleviation.

In sum, forestry could make a significant contribution towards Bolivia's single most important problem: widespread, severe poverty. Its potential, however, remains to be appreciated and fully utilized.

[15] The BOLFOR project has generated many articles and reports.
[16] Putz, F. 2002.

3.5.2 Impacts of the 1996 Forestry Law on Mahogany Regeneration

Concern about the effects on the forest of the practice of "high-grading" through removal of mahogany motivated the passage of the 1996 Forestry Law. The government charged loggers by volume of wood they extracted from the forest. Consequently, except where land was being permanently cleared of forest, loggers generally selected only the stems in the forest that had sufficient commercial value to justify the relatively high costs of logging and transportation. In extensive areas, therefore, logging did not remove more than one to three cubic meters/hectares of only the three most valuable species, mahogany, Spanish cedar and Spanish oak.[17]

The 1996 Forestry Law stimulated more intensive exploitation of the lowland tropical forest by changing the basis of payment to area rather than volume. As previously described, the Forestry Law requires payment of US $1 per hectare of production forest in the concession every year and permits logging on only five percent of the entire area of the concession each year; the payment per hectare thus amounts to a minimum payment of US $20 per hectare. These provisions were intended to force loggers to cut other species than mahogany and cut higher volumes per hectare. The logging of higher volumes and more species, it was argued, would make sustainable forest management financially attractive, maintain the value of the forest, and force the development of markets for lesser known woods.

There is, in fact, little evidence that the removal of commercial size mahogany in itself caused significant ecological impact. Frederickson, for example, found that the "…low volume of exploited wood (with an average of 0.25 cubic meters per hectare) and the reduced subsequent interventions have left the forest mostly intact with the exception of the commercially most valuable species."[18] The principal impact from logging operations came from the over-exploitation of forest animals to feed logging crews.[19] Moreover, although it was the concern for "high-grading" of mahogany that stimulated the approval of the 1996 Forestry Law, the removal of a wider range of species and higher volumes per hectare have not resulted in increased mahogany regeneration. Evidently, in most situations, even these higher rates of exploitation do not create the conditions required for adequate mahogany regeneration.[20] As yet there appears to be no reliable silvicultural solution for obtaining adequate mahogany regeneration in Bolivia's lowlands. [21]

3.5.3 Impact of Higher Logging Volumes and Harvesting of More Species on Forest Ecology

The change from a silvicultural system that removed low volumes per hectare of only a few species to one that removed three or four times more volume and number of species raises obvious questions about potential impacts on the forest's structure and ecology. Putz notes that the research has indicated that intensification of logging does in itself usually not cause significant negative impacts on soils, wildlife, or remaining vegetation because for the most part the forests of the eastern lowlands are quite open and already disturbed previously. [22]

Mostacedo and Frederickson found, however, that nearly 80 percent of commercial timber species were not regenerating at levels sufficient to replace the trees that had been removed. Not only is regeneration of valuable species the main objective of a silvicultural system but it is essential for maintaining the ecological characteristics of the forest. If reliable techniques for achieving adequate regeneration have not yet been developed, then the ecological risk involved in more intensive exploitation probably is as high or higher than those related to removing a relatively small proportion of the total wood volume per hectare, concentrated in mahogany, Spanish cedar and Spanish oak. After all, if up to 20 species of commercial trees are being harvested in a forest and not being regenerated it is clear that the silvicultural system is affecting the species composition

17 ibid.
18 Fredrickson, Todd. 2000.
19 Putz, F. 2002.
20 ibid.
21 Readily available reports do not provide data or discuss the density of mahogany that remains in the forest after the "high-grading" has occurred. The implication in the reports is that there is almost no mahogany in the lower diameter classes.
22 Putz, F. 2002. Personal communication.

of the forest. If USAID/Bolivia takes some credit for the shift from extensive to intensive forest management practices, then it should be concerned with the impact of such practices on forest regeneration and, therefore, the future species composition of the lowland forest.

3.5.4 Impact of Certification on Bolivia's Forests

The area of certified forest in Bolivia grew rapidly after the passage of the 1996 Forestry Law, reaching a total of 970,267 hectares by 2002. One reason for such rapid growth is the close match between the requirements of the 1996 Forestry Law and its regulations and globally accepted forest certification principles and criteria.[23] Without much additional cost, vertically integrated primary wood processing companies could obtain the benefits of certification.[24] Like the regulations, certification requires the preparation and implementation of forest management plans that maintain the ecological structure of the forest. The beneficial impacts of certification on Bolivia's forests, therefore, do not go much beyond those that would result from the effective implementation of the Forestry Law regulations themselves in the Permanent Production Forest. Certification does, however, provide a monitoring and evaluation mechanism that could continue to operate even if the *Superintendencia Forestal* were to become unable to effectively enforce the forestry regulations.

The downward trend in the area of the Permanent Production Forest in industrial concessions suggests that the certified forest area in industrial concessions is unlikely to expand much beyond the 559,991 hectares that are now in the process of being certified. The area of certified forest in TCOs and ASLs, however, could expand beyond the 122,319 hectares now in the process of being certified. As of October 2002, there were 4,016,251 hectares of the Permanent Production Forest in 67 different areas that were in the process or already approved as ASLs. TCOs had claimed 5,716,587 hectares as of November 2001, but had been given title to only 2,051,943 hectares in the departments of Santa Cruz, Cochabamba, La Paz and Pando.[25] The combined area of TCOs and ASLs that is potentially available for forest certification is therefore, 4,954,790 hectares. Data are not available on the proportion of this area that has forest cover that could be certified. Even if all this area were to be certified, however, its area, plus that of the actual and potential 1,530,258 hectares of certified industrial concessions, would be 6,485,048 hectares. This area would be only about 15 percent of the entire and about 22 percent of the northern lowland, Permanent Production Forest. In terms of area, therefore, although the certification program is important, it is likely to have an impact on a large percentage of Bolivia's Permanent Production Forest only if a much larger area of the *tierras fiscales* are eventually assigned to TCOs and then certified.

3.5.5 Impact of Land Ownership Patterns on Forest Management

One purpose of the 1996 Forestry Law was to reduce the predominant control over forest concessions by a restricted number of primary wood processing industries and involve a wider range of rural people in the management of areas of the Permanent Production Forest. Table 3.2 indicates that this "democratization" of forest access and management has indeed occurred since 1996. In 1996 the primary wood processing industry held 127 long-term cutting contracts on 15.09 million hectares and 58 short-term contracts on an additional six million hectares for total of 185 contracts on 21.0 million hectares.[26] By 1997 the wood industry had reduced the

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23 Another reason for the rapid growth in certified forest area is that the size of the forest management units in lowland Bolivia tends to be quite large.[23] Only seven primary wood product companies controlled the 970,267 hectares of certified forest in Bolivia as of October 2002. An additional 682,320 hectares, 559.991 hectares of which were in 10 industrial concessions, and 122,319 hectares were in six TCOs and ASLs, were in some stage of the certification process. The average size of these forest management units is thus over 50,000 hectares for the industrial concessions and over 20,000 hectares for the TCOs and ASLs.

24 These include (1) fewer required inspections on the part of the *Superintendencia Forestal*; (2) a means to gain the support of company personnel for changes in forest management methods; (3) improved public perception of the primary processing forest industry; (4) reduced risk from invasion by colonists or claims on concession areas by indigenous peoples; (5) maintenance of market access and potential of access to niche export markets for certified wood or wood products.

25 Of these 2 were in Tarija, 12 in Beni, 2 in Cochabamba, 14 in La Paz and 22 in Santa Cruz.

26 Quiroga, Maria S. & Elvira Salinas. 1996.

area under its control in concessions by 9.50 million hectares to only 5.50 million hectares.[27] Since 1997 an additional 1.10 million hectares of industrial concessions have reverted to the national government so that in 2002, 4.44 million hectares remained in industrial concessions, only a little more than 10 percent of the Permanent Production Forest. By contrast, in 2002, the area in concessions given to TCOs and ASLs had grown to 0.80 million and 0.60 million hectares respectively and privately owned forest property had grown in area to 0.50 million hectares. However, the potential area of forest under control of TCOs and ASLs, as discussed in the previous section, was almost five million hectares.

The change in patterns of legal ownership or control over the forest from industrial concessions to TCOs, private owners, and ASLs, will require that effective forest management be flexible in its focus. Industrial concessionaires are predominantly interested in exploiting the highest quality timber with the lowest possible costs. Although those who control TCOs, ASLs and private forestland may also have this interest, they also tend to look to the forest for other benefits, such as land for shifting, subsistence agriculture, non-commercial forest products, wild game and other foods, and perhaps even the financial resources to pay for the health and education of their community members. Consequently, forest management, including zoning, road construction, pre-and post-harvest treatments, selection of crop trees, logging techniques, and capital investments, on a particular forest management unit controlled by a private landowner, a TCO or an ASL must typically respond to a wider range of objectives. It may, for example, have to incorporate into its silvicultural system the practices of subsistence agriculture, which utilize the cutting and burning of forest vegetation to improve temporarily soil fertility.[28] Or a sustained flow of non-commercial forest products, such as fruits or game, may require modification of silvicultural systems to protect specific sites, vegetation or even individual species and trees. Likewise, forest management may have to establish financial structures that ensure a reliable flow of income from the sale of forest products to support health programs and local schools. In sum, "democratization" of control over the lowland forest demands that forest management respond adequately to a wider and more variable array of interests.

3.5.6 Impact of Insecurity in Property Rights on Forest Management

The prevalent insecurity in property rights severely constrains the future of forest management in the lowland forest of Bolivia. The largest source of insecurity derives from an article in the constitution of Bolivia that reserves all forests as state property. All Bolivian forests are therefore subject to government decisions. Thus even forests that occur on privately owned property, and their products and services, do not belong to the landowner but to the state. Few people have much interest in taking good care of any kind of property that is not theirs. Forest management is particularly influenced by insecurity in land or use rights since the principal commercial product from a forest, wood, can be harvested on a minimum cycle of 20 years according to the Forestry Law and its regulations. Without absolutely secure rights to the forest, what individual or company would rationally invest for a return 20 years in the future?

The issue of private rights in forests was debated, occasionally quite acrimoniously, during the discussions about the new forestry law that occurred from 1992 to 1996. The *Camara Nacional Forestal (*CNF), which represented the existing forestry concessionaires, argued not only that forests should be considered part of the land they grow on but that the existing concessions should be converted into private properties. Widespread opposition developed, however, to the transfer of rights in public forests to private owners, and especially to the existing concessionaires. The main concern was the creation of large properties in the eastern lowland forest owned by the well off, to the exclusion of poor and indigenous peoples. The National Congress, therefore, rejected the concept of privately owned forests or the transfer of property rights to concessionaires. However, the Forestry Law, as previously discussed, did attempt to more closely tie control over forests to land ownership. It gave exclusive exploitation rights to property owners of forests on their land, transferred property titles to

[27] The industry logically chose the area of forest that had not yet been cut over and which had no or fewer conflicts with other claimants.

[28] Putz, F. 2002.

TCOs, assigned ASLs long-term rights to certain sections of the *tierras fiscales*, and established a period of 40 years for the industrial concessions, renewable every five years. These measures do not, however, provide the same measure of sense of security as does private forest ownership.

Another source of insecurity derives from overlapping claims to land and to the right to produce forest products in much of the eastern lowland forest. During the many decades when the eastern lowlands were remote and lightly populated, these overlapping claims did not create too much conflict. Now, however, as the population grows rapidly through colonization, as the road system permits improved access, and as the national government attempts to define clear titles and defined boundaries within the forest, the conflicts over land and forest products have grown. In Pando, for example, the "*barraqueros,*" traditionally organized the rubber tapping and collection of Brazil nuts from defined areas in the *tierras fiscales*. They did not, however, obtain formal land titles to these sections of the *tierras fiscales*. When rubber prices collapsed in the early 1990s, the rubber tappers moved off of the "barraqueros" to the outskirts of Cobijas and Riva Alta. Colonists from the highlands who, according to INRA regulations, can claim up to 500 hectares per family that belongs to a "community", are replacing them by invading parts of the "*baracas*" and demonstrating possession through clearing of the forest. Thus the claims of "communities", often supported by international social and environmental NGOs, in some cases overlap the areas where the "barraqueros" previously organized rubber tapping and now organize the harvest of Brazil nuts. Similar overlapping claims are frequent in lowland Bolivia between indigenous peoples and timber concessions, between timber concessions and protected areas, and between colonists and indigenous peoples.

In response to these types of overlapping claims, INRA initiated and continues to carry out a process of sorting out and resolving conflicting claims, known in Spanish as "*saneamiento.*" Of the total area of the Permanent Production Forest of 41.2 million hectares, INRA had resolved conflicting claims on about 7.0 million hectares or 17 percent by the end of 2002. INRA plans to resolve conflicting claims on an additional 3.3 million hectares by the end of 2003 and 1.2 million hectares by the end of 2004. Remaining without resolution of conflicts will be 12.4 hectares or 45 percent of the total Permanent Production Forest.[29] So far, INRA has not identified a source of funds to complete the resolution of conflicts on this area of the Permanent Production Forest.

A third source of insecurity in property rights stems from the diverging objectives between the *Superintendencia Forestal* and the *Superintendencia Agraria*. The *Superintendencia Forestal*'s objective is to establish permanent forest management units within the area of the 41 million hectares of Permanent Production Forest that is outside of protected areas in the eastern lowlands. The *Superintendencia Agraria*, by contrast, has the mission of distributing *tierras fiscales* to poor colonists from the highlands. To it, many areas of the Permanent Production Forest are simply empty lands suitable for colonization. Article 2 of the 1996 "*Ley de Servicio Nacional de Reforma Agraria,*" although referring to use of land for forestry production and protection of biodiversity, places its emphasis on the socioeconomic purpose (*función ecónomico-social*) of the land. Article 42 of Chapter II, moreover, says that land will be distributed "…exclusively to rural communities, indigenous peoples and communities…" The National Agrarian Commission, for example, which is responsible for "…the distribution, regrouping and redistribution of land, whatever its condition or use…" is composed of eight members. Of these, six represent the interests of agriculturists, colonists, indigenous groups and labor unions while the other two are the Minister of Sustainable Development and Environment and the National Secretary for Natural Resources and Environment. There is no representation of the forestry sector. The existence of such a government body, with the power to determine the destiny of forestland, added to the clear orientation of the 1996 *Ley de Servicio Nacional de Reforma Agraria* towards the distribution of land to colonists and indigenous peoples, creates great insecurity in the forestry sector, limiting long-term investments in sustainable forest management and production of forest products.

[29] INRA- SAN-SIM, 2002.

3.5.7 Impact of Forestry Regulations on Wood Production

In its fee structure and regulations the 1996 Law favors wood production from TCOs, ASLs and private lands over that from industrial concessions. The industrial concessions are required to pay a fee of US $1 per hectare per year on the entire production area of the concession, although they can only exploit timber on five percent of the concession per year. The charge thus amounts to US $20 per hectares exploited. TCOs and ASLs, by contrast, pay only US $0.30 per hectare actually harvested. Industrial concessions and ASLs must pay their concession fees in January, July and August regardless of whether they have harvested timber or not; the concession is subject to reversion if the fee is not paid.[30] The regulations require detailed, technically sound management plans and timber census for timber harvesting on properties over 200 hectares. They require only a timber census on properties less than 200 hectares and nothing for properties less than five hectares. The Forestry Law also places the burden of protecting the concession from invasion by colonists on the holder of the concession, not on the government.

Helbingen calculated that the 1996 Forestry Law "…limits profitability of commercial forestry, effectively reducing the Net Present Value by about 20 to 50 percent…".[31] One reason for such a reduction in the NPV is that, as a result of these regulations, the cost of obtaining permission to harvest on private property is Bs.0.51 per cubic meter harvested as compared to the cost on concessions of Bs.170.25 per cubic meter harvested.[32] This difference in cost is one likely reason for the decline in wood production on the concessions from 258,594 cubic meters in 1999 to 151,561 cubic meters in 2001 while the production of wood on private property rose from 105,753 cubic meters in 1999 to over 300,000 cubic meters in 2001; production of wood on private property has tripled while production on concessions has almost halved.[33] The wood from private properties may actually largely be coming from areas of forests on properties of less than 200 hectares, where management plans are not required or from areas of less than five hectares, where deforestation is permitted without government approval.

The possibility exists, that the forestry regulations themselves are in part responsible for stimulating the production of wood from unmanaged forests and from forests that are being eliminated in order to change land use to agriculture and pasture. Logs from forest conversion sites, from illegal cuttings, or from forest areas of less than 200 hectares, produces wood that is cheaper than wood from forests that are managed legally according to the regulations of the Forestry Law. Such informal, and sometimes illegal logging, thus undercuts the financial basis for sustainable forest management in the industrial concessions, private properties, ASLs and TCOs.

3.5.8 Impact of National Policies on Forest Management

National policies favor the conversion of forestland, even forest that has been legally designated for forest use, as Permanent Production Forest has been, to agriculture and pasture use. Some examples of national forest policies that favor conversion of land use from forest to agriculture and pasture include:

- The national, regional and local governments encourage colonization of the eastern lowland forests.[34] Colonists cannot generally live solely from the sale of forest products. Therefore, they clear forest for agriculture and pasture, using a system of shifting agriculture in order to maintain soil fertility and control insect and disease infestations.
- The government does not regulate the use of cleared land as it does for forestland. While the Bolivian government claims ownership over all forests and therefore control over management practices even on

30 Castello, L. 2002. TOCs are communal property that cannot revert to the state under any circumstances.
31 Helbingen, Alan. J. 2001.
32 Calculated by the Camara Nacional Forestal.
33 Some portion of this wood is probably produced informally since the Forest Superintendency lacks the capacity to control all logging and land clearing.
34 The Plan Tierra, for example, plans to distribute 500,000 hectares of *tierras fiscales* in the lowlands to 10,000 colonists.

private land with forest, it does not claim such control over pasture or agricultural crops. Whereas forest management involves complicated and expensive preparation of management plans, and the risk of fines if the management plan is not adhered to, agriculture and pasture involve no plans, regulations, government inspections or punishments.[35] The agricultural sector pays taxes only after the production period, forest concessions must pay fees before logging and whether an area is actually logged or not. By converting forestland to agriculture or crops, those who occupy or own land escape from bothersome and financially burdensome government controls.

- INRA is more likely to give a land title if there is evidence of occupation; clearing off forest often the easiest and least expensive way for colonists to indicate that they are occupying land. With a title the value of the land increases and there is more possibility for using the land itself to guarantee bank loans since agricultural land is privately owned. Industrial concessions and ASLs, by contrast, cannot benefit from increases in land values or from the use of land to guarantee loans. TCOs cannot generally guarantee loans either since they are communally owned.
- Deforestation frequently increases land values; in most areas cleared land has a higher market value than forested land. Therefore, it may be worthwhile for colonists to invest their time and labor in forest clearing with the hope of recuperating them in increased land values.
- The national government has requested large, long-term, low interest loans from the multi-lateral banks, such as the World Bank and the Inter-American Development Bank, to finance the expansion of agriculture and pasture. It has not requested equivalent loans to finance the cost of establishing forest management.[36]

In sum, from the point-of-view of colonists, deforestation is often a rational decision to reduce government interference, produce food, gain land title, augment land values and increase their income. National policies such as these do not only stimulate conversion of forestland to agriculture and pasture but they also make Bolivian primary wood products produced legally from managed forests relatively non-competitive in some national and many international markets. Brazilian wood, for example, on the average, costs US $19.20/cubic meters delivered to the sawmill compared to a cost of Bolivian wood with similar conditions of US $43.20/cubic meters.[37] An indication of lack of competitiveness of Bolivian imports of wood products from other Andean countries grew in value from US $3.338 million in 1995 to US $8.382 million in 1999 while the value of its exports grew only from US $1.446 million to 1.973 million.

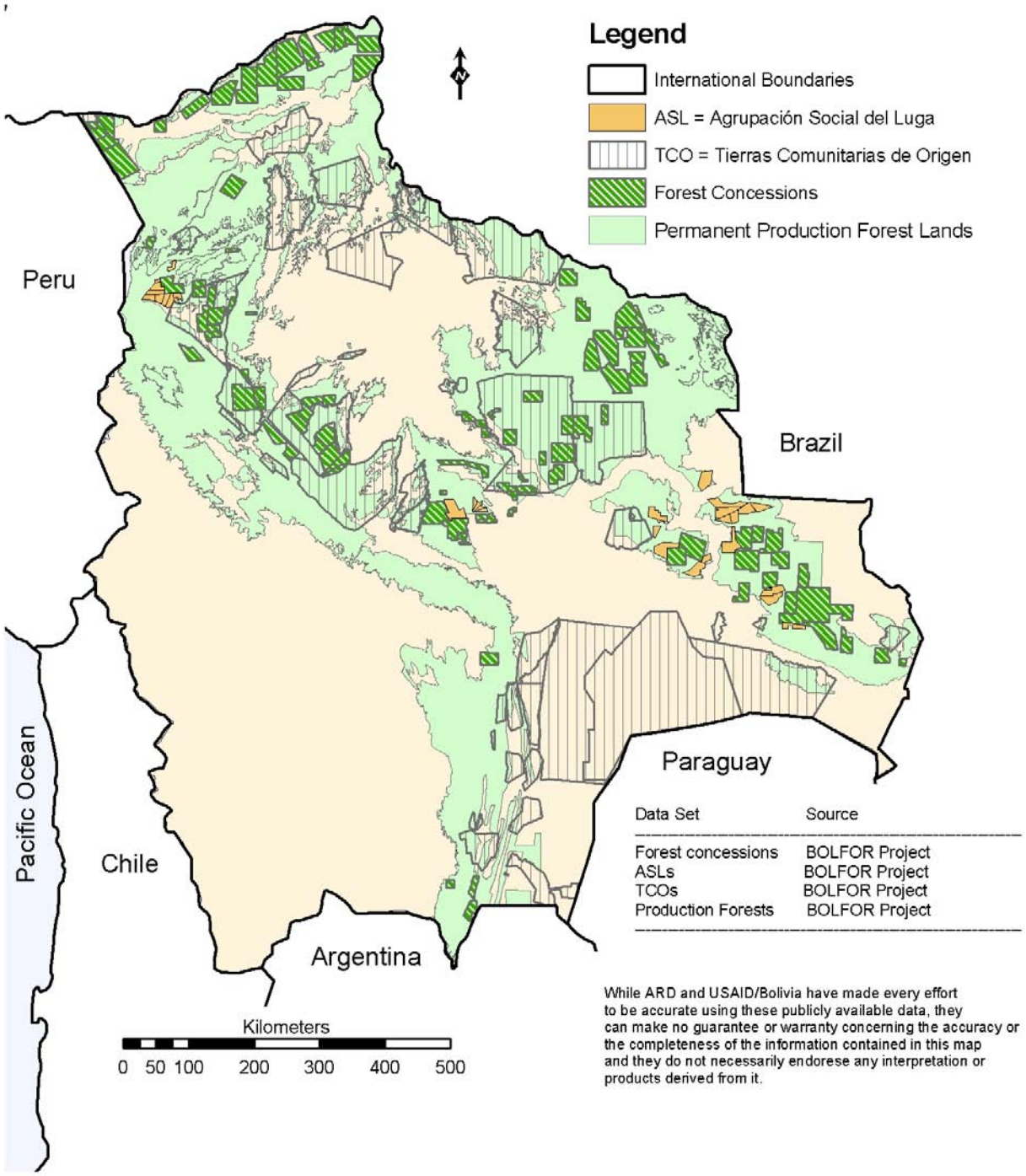
Bolivia's potential production of wood could be as high as 20 million cubic meters per year compared to its present production of something under one million cubic meters per year. Bolivia does not have a sufficiently large domestic market to absorb a large increase in production of wood at prices that would pay the costs of forest management. The sustainable management of Bolivia's Permanent Production Forest, therefore, requires strong external markets for logs, sawn wood, and secondary products. Otherwise, forest management will not be able to compete as a land use with the alternatives of agriculture and pasture. Note that most of the factors that make Bolivian wood relatively non-competitive apply equally to industrial concessions, private land, TCOs and ASLs. These disincentives thus threaten the viability of TCO and ASL forest management as much as that of industrial concessions.

[35] Preston, P. 2002.

[36] According to Ing. Roda, for example, the Inter-American Development Bank, for example, has financed the expansion of the soy bean cultivation in Santa Cruz Department with 12 year loans that have a two year grace period.

[37] Luis M. Castello & R. Roca. 2002. There are, of course, other factors, such as distance to markets, that make it difficult for Bolivian wood products to compete successfully.

Map 3. Forest Concessions, TCOs, ASLs, and Permanent Production Forest Lands in Bolivia



3.5.9 Impacts of Major Road Construction Projects on Forests

The rate and location of the deforestation occurring in Bolivia is closely correlated with the construction and improvement of its road system. The construction, and sometimes the upgrading of roads, lowers the cost of transporting forest, agricultural and livestock products. Lower transportation costs increase the financial return on production of these products. As previously discussed, however, in many situations the incentives for clearing forest in order to change the land use to agriculture and pasture are greater than those for maintaining land with forest cover and managing the forest for the production of wood and non-timber forest products. The construction or improvement of roads, therefore, frequently stimulates widespread and rapid deforestation.

The Santa Cruz-Chapare-Cochabamba highway provides one example of how road construction and improvement is frequently linked to deforestation. The first road between Cochabamba and Santa Cruz ran through the highland valleys, not through the Chapare. In the late 1960s, USAID financed the construction of a road into the Chapare from Cochabamba. This road, as was intended, encouraged the colonization of the Chapare and, easily accessible, it became the center of the 1980s coca boom. In the late 1980s and early 1990s the Inter-American Development Bank (IADB) financed the extension and paving of this road from the Chapare to Santa Cruz. As a result, the Cochabamba-Chapare-Santa Cruz axis is now poised to become a major international trucking/commercial corridor, especially if a good, paved highway is completed from Santa Cruz to the Argentina border.

Whether the expanded use of the Cochabamba-Chapare-Santa Cruz highway will increase the rate of deforestation depends on the relative incentives for maintaining land under forest use compared to the incentives for its conversion to pasture and agriculture. Good roads would, in theory, make the production of forest products for, say, markets in Argentina, more financially rewarding. However, if the incentives, such as those previously discussed, continue to be skewed towards pasture and agricultural production, then the lower costs associated with the improved road may continue to stimulate conversion of forestland to agriculture and pasture. The massive deforestation for pasture that has occurred in Santa Cruz Department could well also occur in the Chapare. The land use planning and forestry activities being financed under the Alternative Development Strategic Objective, it should be noted, serve as a mitigation measure for the deforestation that may result from the conversion of the Cochabamba-Chapare-Santa Cruz road into a major international transit axis.

The construction of a new highway into the province of Coroico in the Yungas of La Paz represents a rather unique cause of deforestation. The Yungas of La Paz, which are the eastern foothills of the Andes (at an elevation between 500 and 2,500 meters above sea level), provides the habitat for a tremendous variety of plants and animals. The construction of the new highway will place this region within a 45 or 50 minute drive from La Paz. As has happened throughout Latin America, this proximity to a large urban area will threaten Coroico with massive conversion of forestland to other uses. One possible use is the establishment of suburban communities for the more affluent who work in La Paz. Such suburbs may be followed by urbanization and eventual expansion of services and employment centers to the region. Based on experience in other parts of Latin America, this is generally about a 10-year process, so it would fall within at least half of USAID/Bolivia's five-year planning horizon.

It is beyond the scope of this study to examine the potential impacts of the construction of the La Paz–Coroico highway in detail. Nor is USAID/Bolivia, to the team's knowledge, directly involved in financing this highway. Nonetheless, USAID/Bolivia has at least two interests in the construction of the highway. First, the highway will lower the cost and difficulty of access to the areas of the Yungas of La Paz where illicit cultivation of coca is expanding. The road will, therefore, support USAID's antinarcotics program by lowering the cost of moving licit agricultural products to the La Paz market. Second, USAID/Bolivia's environmental program has a focus on the conservation of the biodiversity of the Yungas region through the establishment and management of protected areas. The La Paz-Coroico road will facilitate access to some of these protected areas. On the one hand, such improved access may help to monitor activities within the protected areas and promote their use for

ecotourism. On the other hand, however, improved access may increase illegal invasions inside the boundaries of the protected areas. In sum, it appears that the construction of the La Paz–Coroico road will influence the possibility for achieving USAID's objectives for elimination of illicit coca and for conserving biodiversity. It may, therefore, be worthwhile for USAID/Bolivia to examine in more detail the impacts of this road on its program for 2004 to 2009 in order to formulate effective mitigation measures.

3.5.10 Status of Key Institutions for Forest Management

The 1996 Forestry Law gave five national, regional and local institutions responsibilities related to forest management. The 1996 *Ley de Servicio Nacional de Reforma Agraria* established INRA as an additional institution with influence on forest management. The objectives and effectiveness of these six institutions will profoundly influence the management and therefore the future prospects for Bolivia's Permanent Production Forest. At present, however only one of the first five institutions, the *Superintendencia Forestal*, is fulfilling its responsibilities to any significant extent and even its effectiveness is at risk and INRA, has an equivocal role in promoting forest management.

The *Superintendencia Forestal* is generally perceived as a professional, honest, dedicated institution. However, it lacks sufficient financial resources to support the field operations required to adequately inspect and control forest management operations and the movement of forest products. If the 21 million hectares under cutting contracts in 1996 had converted to concessions, then the annual income of the *Superintendencia Forestal* would have been approximately US $6 million, sufficient to cover its operating expenses. With a concession area of less than six million hectares, however, the Superintendencia Forestal can, therefore, expect to receive less than US $2 million per year from the *patente forestal*.

In fact, none of the concessions are actually paying the full amount of the annual *patente forestal* and they owe almost US $10 million. Rather than strictly enforce the regulations, the *Superintendencia Forestal* chose to be lenient and did not revoke the concessions for non-payment of the *patente forestal,* as required by the forestry law. It argued that the reversion of the concessions to the government would leave large areas of the Permanent Production Forest open to colonist invasion. The consequence of such leniency, however, has been that even concessionaires who could pay the *patente forestal* have stopped doing so. Moreover, in spite of lack of funding, the *Superintendencia Forestal*, has not utilized more than a few of the more than 40 options for enforcement provided for in the forestry regulations.

If the *Superintendencia Forestal* does not receive adequate financial resources its technical capabilities may quickly decline. It will risk losing its present hard-earned, and easily lost, reputation for effectiveness and honesty. And it is the effectiveness of the *Superintendencia Forestal* that makes organized forest management possible in Bolivia.

The FONABOSQUE initially did receive some funds from the payments of the *patente forestal* but rather than being utilized for investments, these funds were diverted to finance part of INRA's land titling process and the operational expenses of the *Superintendencia Forestal*. The *Dirección General de Bosques* remains sidelined, with a skeletal staff and little possibility for influencing Bolivian forestry policy. The *Prefecturas*, eminently political institutions, have not assumed their responsibilities for enforcing the forestry regulations.

The municipalities are the level of government that is closest to rural people and have legal responsibility for land use planning at the local level. They have, therefore, an important role in influencing land use and especially in controlling the indiscriminate conversion of forestland to agriculture and pasture by assisting TCOs and ASLs to establish forest management units that can compete with agriculture and pasture by providing the benefits from the forest to rural people. Municipalities also have a key role in controlling forest fires. The 1996 Forestry Law requires municipalities with forest areas to establish Forest Management Units. As of late 2002, however, only about 14 of the 114 municipalities with forests had established these units. Most municipalities,

moreover, were not using the funds they had received from the payments of the *patente forestal* to promote forest management. The lack of interest or capability of the municipal governments to carry out their responsibilities under the forestry law leaves a significant gap in the institutional structure that was set up for its implementation.

INRA, by resolving land use conflicts, can play a critical role in establishing the basis for long-term forest management. It can also, however, stimulate deforestation by using forest clearing as proof of land occupation. If the *Superintendencia Forestal*, the *Superintendencia Agraria* and INRA work together towards the goal of establishing forest management as a legitimate, permanent land use in the eastern lowlands, forest management may be possible over wide areas and will contribute to the forest conservation. If the three institutions continue to have conflicting objectives, the potential for forest management and conservation will be greatly reduced.

3.5.11 Research on Regeneration of Commercial Tree Species[38]

The 1996 Forestry Law established regulated forest planning using inventories, tree marking, stand mapping, and reduced-impact logging techniques. Forest management, however, requires more than planned logging. It should secure regeneration, improve tree growth, and maintain stand quality. Mostacedo and Frederickson (1999) found that nearly 80 percent of commercial timber species were not regenerating at levels sufficient to replace harvested trees. They attribute the lack of regeneration to harvesting practices that did not stimulate the regeneration of shade-intolerant commercial tree species.

The components of a silvicultural system that will result in adequate regeneration have been emerging from preliminary research results in Bolivia's lowland forests. These results suggest that the characteristics of large areas of the present lowland forest are the result primarily of past land uses. For example, most of the commercially valuable tree species, for example, are light demanding and regenerate prolifically only on roadsides and in abandoned agricultural clearings. Soil scarification with the blade of a skidder in large felling gaps promotes regeneration of several valuable species. Pottery shards and charcoal are abundant on surface soils in many parts of the lowland forest and many soils were purposefully improved in the past. These results indicate that regeneration in the lowland forest may require sufficient disturbance so as to create the required conditions of mineral soil and abundant light. Additional participatory research, focused on the relationship between shifting agricultural practices and forest regeneration, would confirm these preliminary findings. Studies on household and community-level economics would permit the development of silvicultural practices that correspond to the land use practices of local people.

Almost all forestry research in Bolivia, however, has been and continues to be financed by international projects. These projects have not, however, helped Bolivia to establish its own institutional capacity to carry out and finance silvicultural research. As the international projects end, therefore, the risk exists that such silvicultural research will be terminated. The silvicultural systems for assuring regeneration of the commercial species that are being harvested in the lowland forest, largely as a result of the requirements of the 1996 Forestry Law and its regulations. Without such systems sustainable forest management will not be possible in Bolivia's lowland forests.

3.6 Principal Threats to Tropical Forests and Impediments to their Management

3.6.1 Deforestation

In December 2002, BOLFOR completed a study of the rate of deforestation in Bolivia between 1993 and 2000. It found that the total deforested area in Bolivia in 1993 was 2,125,344 hectares and in 2000 was 4,779,152. The difference indicates that between these two years 1,892.331 hectares were deforested in Bolivia, or an average of

[38] Based largely on observations and recommendations of Putz, F. 2002. Personal communication.

270,333 hectares per year. The authors of the Forestry Map of Bolivia, by contrast, estimated a national deforestation rate for the 18 years between 1975 and 1993 of 168,012 hectares per year. These data indicate that the rate of deforestation in Bolivia from 1993 to 2000 was 102,321 more per year than during the period 1975 to 1993. The available data did not indicate whether the rate of deforestation has increased or decreased in the last few years.

The BOLFOR study found that most rapid rate of deforestation was in the Department of Santa Cruz where between 1993 and 2000 1,424,033 were deforested, giving an annual rate of deforestation in that department of 203,243. Note that this is more deforestation per year in just the Department of Santa Cruz than was previously estimated for all of Bolivia. The study found that the deforestation rate in the other six departments combined was 66,900 hectares per year between 1993 and 2000. (Source: BOLFOR. 2002. Study of Rates of Deforestation in Bolivia [Draft]).

3.6.2 Forest Fires

Fire is a widespread, severe and permanent threat to Bolivian lowland forests. The extent of forest fires, moreover, has increased during the last decade. The principal cause of forest fires is the spread into forests of fire started on purpose in order to clear land for agriculture or to renovate pastures. The worst year for forest fires in recent history was 1999, when fire affected 12.7 million hectares in the departments of Beni and Santa Cruz.[39] In 2001 fires burned 1.3 million hectares in the same departments in 2,570 separate fires. The fires of 2001 affected 24 forest concessions in the departments of La Paz, Santa Cruz and Beni on 21,950 hectares. They also affected the protected areas, the ASLs and the TCOs. Fires cause loss and degradation of forest cover, fauna and flora and contamination of air and water and soil degradation.[40] Since many fires burn slowly and lightly their impacts may not be immediately discernable but rather long term and insidious.[41]

Since forest fires spread from agriculture and pasture lands, the conversion of part of the forest to agriculture and pasture, especially when it occurs on relatively small properties, scattered through forested areas, threatens the remaining forest with degradation by fire. Colonists who live from small-scale agriculture use fire as a principal tool in their systems of production. When their agricultural areas lie adjacent to forest areas, their fires are likely to spread into neighboring forests. Rural agriculturists have little incentive to control such fires. Indeed, forest fires may frequently make the conversion of land to agriculture and pasture easier. Fire, therefore, is not widely perceived as a serious problem in lowland Bolivia. [42]

3.7 Comparison of Forest Management Systems

As rural people and indigenous peoples control more of the Permanent Production Forest and primary wood processors control less, large continuous forest areas managed primarily for wood production will become a smaller proportion of the landscape. Smaller forest areas, where agriculture and pasture are mixed with forest, and with a wider variety of management objectives, will become more common. The forest's mix of goods and services will change and new systems of forest management will have to be developed to respond to the interests of the rural people and indigenous peoples.

The large industrial concessions offered the ecological advantages of maintaining large areas of relatively undisturbed natural forest. Some animals and plants, for example, need large areas of continuous forest in order to maintain genetically viable populations. The break-up of large extensions of forests into a patchwork of forests with agriculture and pasture may affect the long-run viability of such organisms. The large-scale, vertically integrated forest industry also offered an opportunity to raise sufficient capital, develop markets, and

39 *Ministerio de Desarrollo Sostenible y Planificación*. 2002.
40 *Superintendencia Forestal*. 2002.
41 Putz, F. 2002. Personal communication.
42 ibid.

apply technology that would have made the primary wood processing industry competitive in wood products in international markets.

The shift to smaller-scale and more community-oriented types of forest management systems raises a new set of opportunities and problems for forest management. TCOs and ASLs are not likely to have in the short-term the administrative or entrepreneurial capabilities that would make them competitive producers of primary wood products. Their forest management decisions are more likely to be motivated by social concerns than strictly business calculations. If the forest management unit does not produce financial or non-financial results that satisfy the expectations of the people who control it, they will be likely to convert the land to agricultural and pasture use. Forest management systems that succeed in providing a reliable, equitable flow of financial and non-financial benefits from the forest management units to the members of the TCOs and ASLs will thus be critical for maintaining the forest management units in the face of competition from agricultural and pasture land uses.

3.8 Major Opportunities to Improve Sustainable Forest Management

The major opportunities to improve sustainable forest management arise from the issues that were identified and discussed previously. These opportunities, however, fall into three general groups:

- National policies that support sustainable forest management;
- Key institutions support sustainable forest management; and
- Silvicultural knowledge supports sustainable forest management.

3.8.1 National Policies that Support Sustainable Forest Management

Without supporting national policies sustainable forest management will not be able to compete with agriculture and pasture in many parts of the lowlands that have been designated as Permanent Production Forest. As previously discussed, a number of national policies give incentives for the conversion of forestland to agriculture and pasture. To become a widespread land use that contributes all it could to Bolivian welfare, sustainable forest management needs to operate within the context of supporting national policies. The elimination of policies that give incentives for the conversion of forestland to agriculture and pasture and the establishment of such supporting policies requires three phases.

- First, the impact on forest management of national policies needs to be thoroughly understood. The existing studies on forestry in Bolivia, of which the number is considerable, need to be complimented with additional academically rigorous studies.
- Second, the conclusions and recommendations of the studies on national policies need to be translated into legislation, regulations, and other implementation measures. This conversion of theory into practice will require the interdisciplinary collaboration of specialists in law, finances and politics with professional foresters.
- Third, the results of the studies and the content of the draft legislation, regulations and other measures will have to be communicated effectively to the decision makers. The decision makers include legislators, public administrators, private business people and members of environmental and social NGOs. These types of people and groups have the power to approve and implement the required policy modifications. The effectiveness of such a communication program should be measured by the changes in national policy.

USAID/Bolivia can support changes in national policies so that they support sustainable forest management by financing policy studies, drafting of implementation legislation and regulations and communication to decision makers.

3.8.2 Key Institutions Support Sustainable Forest Management

- Sustainable forest management will also not be possible without the effective, sustained support of key forestry institutions. These institutions include the *Superintendencia Forestal*, the municipal governments and INRA.
- The *Superintendencia Forestal* is unable to carry out its responsibilities it will quickly lose credibility that it presently has. Once lost, it will be difficult for the *Superintendencia Forestal* to regain its credibility. To maintain its present effectiveness the Superintendency Forestal requires (1) short-term financing for its operations; and (2) the full use of its regulatory mechanisms. USAID cannot do more than suggest to the *Superintendencia Forestal* that it utilize all the mechanisms which the Forestry Law makes available to it to enforce the forestry regulations. USAID might, though, finance the operations of the *Superintendencia Forestal* while it seeks a more stable source of financing than the *patente forestal* has proven to be.
- The 1996 Forestry Law requires the municipal governments that have forests within their jurisdictions to establish forestry units. Those that have complied with this requirement, however, still lack technical capabilities for sustainable forest management. Widespread, sustainable forest management requires that the local governmental authority be able to promote and regulate forestry operations within its jurisdiction. USAID/Bolivia could provide critical technical support to the forestry units of those municipalities that have demonstrated their interest in assuming the responsibilities that the 1996 Forestry Law gave them.
- INRA plays a key role in supporting sustainable forest management. It is responsible for bringing order to a land tenure and use situation that has been frequently chaotic in the Bolivian lowlands. When INRA completes its task of reconciling competing claims on forestland and forest products and, therefore, permits the clear assignation of property and use rights within the Permanent Production Forest, the context will be created for assuring the security of investments in sustainable forest management.

USAID/Bolivia could provide financial and technical support to INRA to permit it to complete its work of "*sanamiento*" expeditiously and without prejudice to sustainable forest management.

3.8.3 Silvicultural Knowledge Supports Sustainable Forest Management Research

Without an adequate technical basis for forest management operations sustainable forest management is not possible. The Permanent Production Forest contains many types of forests, each with its own ecological variations, production possibilities, and social characteristics. Academically rigorous research on ecological, social and economic aspects of forest management establishes the basis for sustainable forest management in each forest management unit. It may in some cases be important to minimize the direct, short-term ecological impacts of the harvesting of wood and non-wood forest products. But most important for sustainable forest management is the successful regeneration of the forest in such a way as to maintain its full range of animal and plant biodiversity and ecosystem functions. Given the large number of species, sites and past land use histories in the Permanent Production Forest research on how to how harvesting practices can stimulate adequate regeneration of the harvested species will require systematic, well-funded research. USAID/Bolivia could most usefully support such research by continuing its funding for ongoing research in the lowlands. It could make a permanent contribution to the implementation of sustainable forest management in lowland Bolivia, however, by working to establish a permanent, well-financed forestry research institute, probably in collaboration with other donors, universities and the Bolivia forest products industry.

4.0 Forest Products Industries

4.1 Productive Capacity of Bolivia's Forests

Of Bolivia's approximately 49 million hectares of forests, 42.5 million hectares are lowland tropical forests under 500 masl and 16 million hectares are classified to be production forests[43]. The standing volume is distributed between the *Amazonia*, *Chore* and the *Panandino-Amazonia* region (77 to 115 cubic meters/hectare) and *Chiquitania Bajo, Paragua y Guarayos* region (43 to 50 cubic meters/hectare).[44] The possible harvest of commercial wood ranges from three to five cubic meters/hectare in the southeastern drier areas to 25 to 30 cubic meters/hectare in the more humid areas in the north of Bolivia. It is estimated that from the production forest only, some 2.5 million cubic meters could be harvested annually on a sustainable basis. Private and community forests provide access to another one to 1.5 million cubic meters that could be harvested. At this point, it should be noted that less than one million cubic meters is currently being harvested from all types of forestland.[45]

4.2 Legislation and Access to Raw Material

In 1996, the passage of the Forestry Law initiated fundamental changes to the Bolivian forest management and forest products sector. The law laid the groundwork for pressing changes in Bolivian forestry and the current initiatives in sustainable forest management. The Forestry Law significantly reduced the number of hectares in concessions available for production forest from 28 million to six million. However, since the reform was first implemented, the amount of land in working concessions has declined precipitously to the point of undermining the successful work of BOLFOR and the effectiveness of the landmark legislation.

Since 1996, no new concessions have been added and the number of existing hectares in concessions has declined to approximately 4.8 million hectares as a result of a variety of economic, political and social disincentives described in Section 3. Other land tenure and policy issue conflicts continue to drive deforestation and forest conversion.

All forestland in Bolivia belongs to the State. The amount of wood fiber that community forests and the private sector will contribute to industry has increased in the last two years and is projected to increase significantly in the coming decade. The stepwise development of the forest products sector will require a non-declining, even flow of raw materials. Consistency of wood species, volume, and quality are the fundamental underpinnings of successful market strategies. Tracking and documenting the actual projected volumes by wood species and grades will be crucial to being able to demonstrate options for "consistency of supply" for product buyers.[46] Regardless, access to timber will depend on controlling the rate of land conversion and developing the organizational capacity of communities and private landholders to harvest and process timber under accepted guidelines of sustainable forest management.

4.3 Competitiveness of Forest Products Sector

Despite Bolivia's extensive forest resources and diverse and productive growing stock, the development of the forest products industry has not met expectation and the sector is facing urgent problems. The forest products sector contributes approximately $220 million or three percent of the GNP. In terms of employment, it is directly responsible for 90,000 jobs and an additional 150,000 jobs indirectly. A variety of problems including lack of financing and investment, poor infrastructure, high transportation costs—as much as 60 percent of production costs—corruption and poor business practices are often mentioned as obstacles to growth.

43 ITTO. 1996.
44 Sacre. 2002.
45 Castillo. 2002.
46 Mater Engineering. 1998.

The other fundamental problem is the diversification of tropical forest production to utilize more than a handful of commercial species such as bigleaf mahogany (*Swietenia macrophylla),* Spanish cedar (*Cedrela odorata*) and roble (*Amburana cearensis*). Today, a group of 20-30 lesser-known species are considered to be commercial or potentially commercial in Bolivia's lowland forests. Since 1998, *ochoó* (*Hura crepitans*), a common, low-density species widely distributed throughout tropical America has been the leading species in Bolivia in terms of annual production. Traditionally, *ochoó* was used for form setting in construction but is increasingly being utilized for door manufacturing and other value-added products. The amount of lesser-known species exported by Bolivia has grown by 10 percent in the last decade with a notable increase to North America and the United Kingdom.[47] Nonetheless, knowledge about utilization, market recognition, product development and lack of consistent supply has limited commercialization of lesser-known species in the global markets.

The exponential growth seen in the certified forest products market—over a million hectares certified and US $13 million in sales in 2001—has not translated to the forest products sector as a whole, which has remained flat, and overall exports have decreased by 20 percent. Although a stagnant economy and a four-year recession have contributed to decline in this sector, the overall productivity of the sector is low. A recent cost analysis demonstrated that costs in all sectors across the entire chain of production are more than three times higher in Bolivia than in Brazil.[48] Bolivia's tenuous share of the tropical timber trade has decreased to less than one percent of the global market highlighting a lack of competitiveness and inability to respond to fluctuating markets.[49]

4.4 Profile of Forest Product Sector

4.4.1 Primary Manufacturing

Primary manufacturing refers to timber harvesting and primary processing (i.e., sawmills) that convert logs into lumber, posts and pilings and cants. Primary manufacturing requires a relatively small investment in portable or stationary sawmill machinery and is the first step in the chain of production that results in a finished wood product. Cursory examination of the first steps in this complicated process indicated that unsystematic sorting, cutting and bucking practices on the landing result in high waste factors in the woods and the mill. The majority of logs are processed at small sawmills that produce building material for local markets distributed by *barracas* (lumberyards) or home centers. Production is still focused on rough sawn or surfaced timber that is air-dried and sold for distribution as random width, 4/4-12/4 lumber or boards (*tablas*), wide planks (*tablones*) and flitches or cants that are re-sawn or sold for posts, squares and beams (*vigas).* The observed quality of rough-cut lumber was substandard with significant variation in thickness, side-to-side thickness, and cutting defects. Green lumber is frequently unstickered and exposed to the elements.

Training in utilization standards and mill requirements on log lengths, minimum diameter and end use is the first step to maximize yield and facilitated primary processing. A high waste factor in the forest and in the mill yard significantly reduces yield. Recovery rates for hardwood sawmills in and the United States run between 50-60 percent efficiency. Equivalent data in Bolivia is unavailable but, according to CADEFOR figures, less than 17 percent of the log is utilized in the final product.[50] Currently, log exports are banned in Bolivia to promote greater in-country value-added manufacturing.

There is no reliable information about the number of sawmills on a regional or national level in Bolivia. Various sources estimated there are approximately 300 sawmills scattered around the major forested areas with the

47 Castillo. 2002.
48 ibid.
49 ibid.
50 Victor Hugo Gutierrez, CADEFOR, personal communication. 2002.

highest concentration in the state of Santa Cruz and Cochabamba.[51] Approximately 70 percent of the operations are classified as "very small" or "small" operations with no single large sawmill dominating the industry (Table 4.1).

Table 4.1. Estimated Size of Sawmills in Bolivia

Size	Production Capacity	%
Very Small	< 1.000 cubic meters/year	10
Small	1.000 – 15,000 cubic meters/year	60
Medium	15,000 – 30,000 cubic meters/year	30
Large	> 30,000 cubic meters/year	-
Total		100

Source: STCP

With the exception of a few of the larger band saw mills, the quality of mills follows a pattern familiar in other parts of the developing world: labor intensive, using outdated machinery with a minimum investment in modern equipment. Traditionally, much of the wood processing machinery was secondhand Brazilian equipment with insufficient training given on operations and maintenance. The more successful operations tend to invest in the installation of state-of-the-art, German and Italian woodworking equipment. Saw and knife sharpening and grinding were consistently cited in the literature as a persistent problem resulting in poor quality sawn timber and additional processing requirements.

There are approximately 45 dry kilns with a production capacity of about 50,000 cubic meters of sawn wood, which doesn't even meet the current underutilized sawn wood capacity. With few exceptions, dry kiln designs are inadequate to produce an efficient, consistent supply of quality lumber. Few mills have invested in kiln drying equipment, limiting expanding markets beyond rough lumber. Lack of attention in the lumber drying process will continue to be one of the single largest fatal flaws to moving volume of lesser-known species to North American and European markets and attracting investments in value-added wood production in Bolivia.[52]

4.4.2 Secondary Manufacturing

The capacity of secondary manufacturing is directly related to the size of the primary manufacturing sector with small and medium sized operations dominating 95 percent of the production. An undetermined amount of the rough lumber and planks are re-sawn by secondary processors for the manufacturing sector. The production of plywood, particleboard and other panel-board products and veneer did not start until the late 1970s and 1980s and is restricted by weak demand in the small domestic market. During the 1990s, Bolivia's value-added sector responded to initiatives of the international development organizations to stimulate growth in this area. Furniture, furniture components, doors, flooring, architectural millwork and case goods were produced with imported machinery. Approximately 50 percent of value-added products are sold domestically. The remainder, mostly furniture, is exported to North America.

A variety of problems in the secondary-processing sector were noted. Inefficient material utilization and industrial flow patterns restrict production and have a negative impact on quality control and, subsequently, on investments in Bolivian operations or joint-partnerships. There is a significant amount of unnecessary handling of materials and components and subsequent inefficient utilization of labor. There is a prominent lack of safety awareness evidenced by dangerous conditions, lack of safety gear and saw guards, and poor training of supervisor and workers. Throughout the chain of production, there is a high waste factor in the recovery of offal and off-cuts.[53]

[51] Castillo. 2002.
[52] Mater Engineering. 1998.
[53] ibid.

Across the board, the installed manufacturing capacity of forest products exceeds actual production by 30-50 percent and in no sector does it approach the capacity of Bolivia's forest resources. At current growth rates, projections for growth through 2010 reflect a modest growth of 5 to 10 percent in all sectors. Most of the value-added businesses are family-owned companies that have developed in the last four decades to serve the domestic market and limited international market. The value-added sector is growing at five percent, but with the exception of few notable examples such as CIMAL-IMR de Santa Cruz and United de La Paz, it is still hampered by limited vision and investment.[54]

4.4.3 Exports and International Markets

Much has been written about Bolivia's potential to develop a vigorous export market for forest products, particularly value-added products for the international market in the US and EU (Sacre, 2002, Castello, 2002, et al.). The current production of forest products in Bolivia is very low—less than 500,000 cubic meters per year. Total exports from the forest sector, including non-timber forest products, declined from $119,922,086 in 2000 to $100,775,819 in 2001.[55] Nearly 70 percent of the wood products were exported to the US and the UK with sawn wood and value-added making up 90 percent of the products (see Table 4.2). Projections by STCP *Engenharia de Projetos Ltda,* however, indicate that production capacity of the forest industry could approach 20 cubic meters/hectares per year with an initial growth of exports of $100 million and projected long-term capacity of $1000 million.[56] These figures reflect optimistic projections that include a strong global economy and removal of barriers to growth.

Table 4.2. Export Figures for Wood Products by Sector

	2000		2001	
Product	**Volume (cubic meters)**	**Value ($US)**	**Volume (cubic meters)**	**Value ($US)**
Brazil Nuts (Shelled)	0.00	32,877,037.68	0.00	30,234,925.00
Sawn wood	44,614.38	24,275,031.09	49,620.36	26,195,603.97
Doors	7,614.46	13,027,923.57	8,739.03	15,802,398.15
Chairs	1,297.13	5,419,620.45	1,251.21	4,959,998.40
Furniture (General)	1,085.90	2,511,070.59	1,321.14	4,433,059.45
Heart of Palm	0.00	3,436,108.61	0.00	3,702,889.84
Flooring	455.68	231,522.92	1,234.37	2,880,338.98
Veneer	1,979.32	2,090,728.03	2,473.03	2,795,211.48
Tables	644.89	1,179,314.14	748.77	1,573,038.72
Benches	927.87	1,910,586.24	438.71	1,294,900.44
Molding	656.32	737,876.67	820.73	915,455.13
TOTAL	63,962.19	87,696,819.99	66,647.35	68,854,171.99
TOTAL (All Forest Products)	**74,792.23**	**119,922,086.21**	**79,817.26**	**100,775,819.22**

Camara Forestal de Bolivia – Proyecto SIFOR/BOL

The global marketplace for wood products, particularly tropical hardwoods, is a relatively unrestricted, open market that is extremely competitive. It is not a commodity market and small margins of profit dictate lowest prices for the highest quality material. Based on detailed studies by BOLFOR, ITTO and GOB, the only window of opportunity is the efficient production and shipping of higher-value wood products such as furniture, furniture parts, doors, flooring, decking and cut-to-size, surfaced, kiln dried lumber in commercial species or lesser-known species with better market recognition.[57]

54 Sacre. 2002.
55 Proyecto SIFOR/BOLFOR. 2002.
56 Castillo. 2002.
57 ibid.

4.4.4 Certified Forest Products

In 2000, third-party certified forest products represented more than $8.5 million—a little more than 10.0 percent of the total wood products in Bolivia (Table 4.3). In 2001, there was an unprecedented 61 percent increase in certified forest products exported. The steep rise in numbers can be attributed to a consistently steady rise of certification of forest concessions in Santa Cruz and marked success of several medium-sized companies selling garden furniture exports to the United States. There are approximately 18 chain of custody certified companies in La Paz, Cochabamba, and Santa Cruz manufacturing a variety of products from sawn wood (lumber) and doors to flooring, finger-jointed panels, moldings, etc.

The Bolivian Council for Voluntary Certification and has strong industry buy-in and no competition from opposing certifications schemes. SmartWood dominates the certification market with a long presence in Bolivia and a history of cooperation with BOLFOR.

Table 4.3. Certified Forest Products in Bolivia

Year	Total Forestry	Total Wood Products
1998	0.15 %	0.24%
1999	2.81 %	3.91%
2000	7.14 %	10.32%

The market for lesser-known species is growing rapidly as substitutes for mahogany, teak and less durable temperate hardwoods for garden furniture and accessories. With the removal of chromated copper arsenical pressure-treated wood from the US market, there is an entry point for durable, rot resistant, tropical hardwoods such as *Ipe* (*Tabebuia spp.*)—an environmentally sound alternative for use in boardwalks, ski areas, playgrounds, decking and a variety of outdoor applications. There is strong promotion from the USGBC and environmental groups to increase the requirements for US municipalities and public works, like government buildings and cities like Los Angeles and New York, to use certified wood. There are some price point and ease-of-application advantages from wood-plastic derivatives in this sector but Bolivian hardwoods have a competitive advantage in the higher-end applications.

As long as housing starts stay strong in North America, the market for tropical flooring and architectural millwork will continue to be strong in residential installations in Florida, California and the southern tier of the US and high-profile hotels, corporate offices and public buildings. The markets in Mexico and the Caribbean basin reflect similar patterns.

4.4.5 Non-Timber Forest Products

The neo-tropical forests of Amazonia and other lowland forests of Bolivia have a wealth of non-timber forest products (NTFPs). Brazil nuts, palmito, rubber, medicinal herbs, botanicals, vines and fibers represent an underutilized and untapped natural resource. In 2002, the export of NTFPs, specifically shelled Brazil nuts, exceeded all other wood products in the forest product sector. With $30 million in sales, shelled Brazil nuts accounted for one-third of all exports from the forest products sector.[58] The growth and production of Brazil nuts is centered in the northern part of Bolivia along the Brazilian border in the States of Beni and Pando. The magnificent nut-bearing tree, *Berholletia excelsa,* grows extensively in the Amazonia rainforests at a density of one to two trees per hectare. The extraction of wild nuts is a labor-intensive process that involves a complex social hierarchy of buyers, producers, handlers and processors and a unique set of land tenure issues.[59]

[58] *Comercio Exterior*, IBCE. June, 2002.
[59] Helbingen. 2001.

The river city of Riberalta in Beni is the center of processing with 18 factories dedicated to producing and shipping shelled nuts. The product is packaged and shipped directly or through brokers to food conglomerates in the United States and Europe. The manufacturing sector has a wide spectrum of development from modern hygienic plants with annual sales exceeding four million dollars to primitive nut cracking and packing facilities with hundred year-old technologies and abysmal working conditions. There seems to be a trend to consolidation in the industry and a significant investment in automated processing and packaging system at Tahuamanu, SA in the city of Cobija in Pando.

5.0 Protected Areas and Conservation of Biological Diversity

Most of Bolivia's biological diversity (an estimated 68 percent of plants and 80 percent of vertebrates) is represented in protected areas. However, some unique habitats and species are absent from these areas. Also, the long-term conservation of many species within current protected areas may still be threatened by human activities and global climate changes. Fortunately, there are still other extensive natural and semi-natural areas, which function as watershed protection, buffer zones, biological corridors, and additional refuges for biodiversity. Maintaining forest cover and promoting the sustainable use of forest resources in these large areas, as introduced in Sections 3 and 6 of this report, will significantly contribute to overall ecosystem function and biodiversity conservation in Bolivia.

The close relationship between the sustainable use of forest resources and the conservation of biodiversity is further illustrated by the fact that often this use also takes place within protected areas. Having acknowledged the difficulty of separating these themes, in this section we focus first on conservation issues related to the management of protected areas, and second on the legal and institutional base for the sustainable use and conservation of plants and animals in the country.

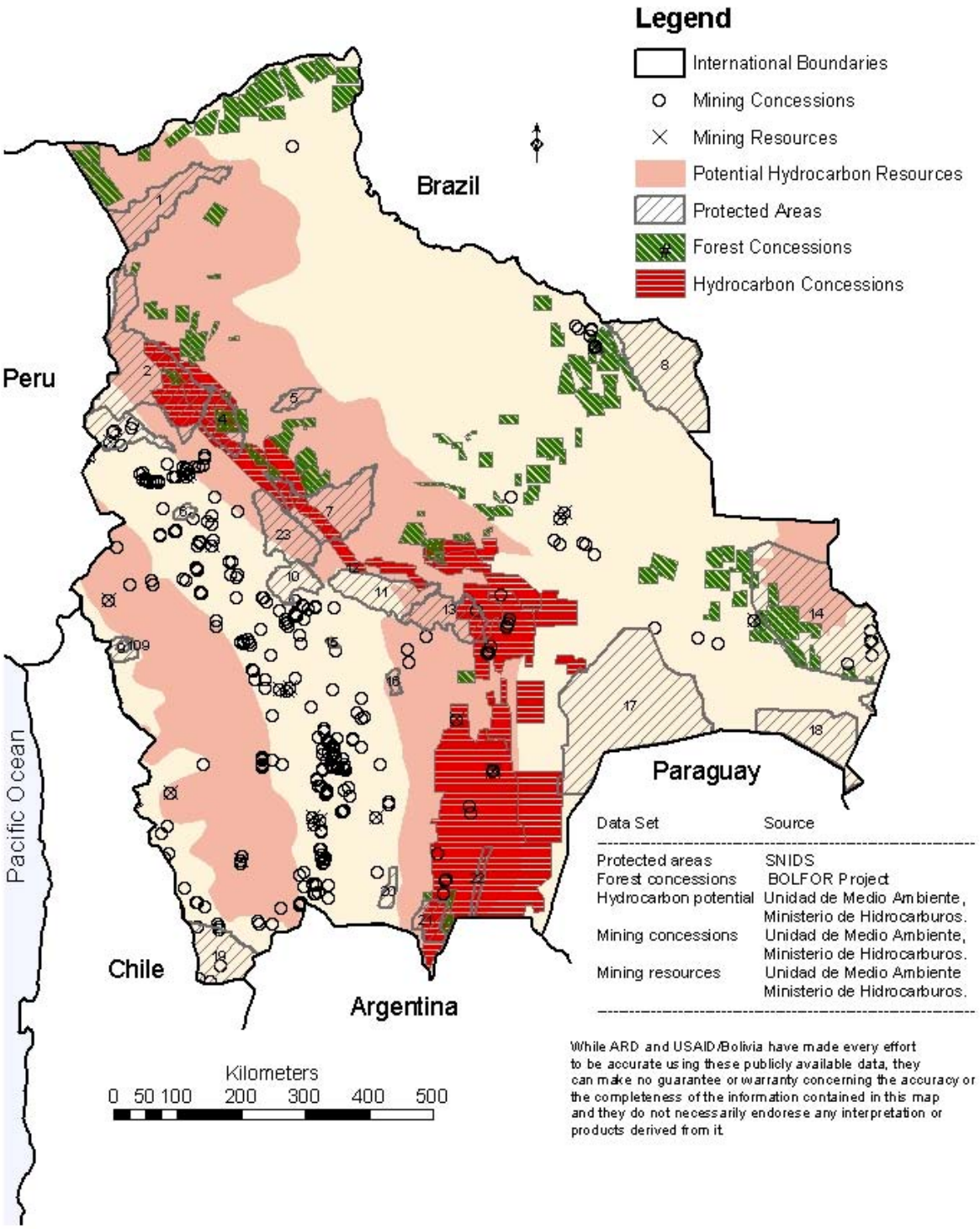
5.1 Ecological Representation in Protected Areas

SNAP currently includes 19 areas under management and plans to incorporate two more, covering about 16 percent of the country (see Map 4). Andean ecoregions, such as the Puna highland (in Sajama and Eduardo Avaroa), and the *ceja de monte*, wet montane and sub-Andean forests of northern Yungas (in Apolobamba, Madidi, Pilón Lajas, Cotapata, Amboró, Carrasco, and part of Isiboro Secure) are well represented within SNAP. The Chaco dry forest (in Kaa Iya) and the Pantanal wetlands (in Otuquis and part of San Matías) are also well represented, as are various forests in the southern Andean Yungas (Tariquía, Sama, Aguaragüe, and El Palmar). On the other hand, threatened ecoregions such as the Cerrado and the Chiquitano forest are only partially represented (in Noel Kempff Mercado and San Matías), as well as the lowland Amazonian forests and savannas (only in Manuripi, Isiboro Secure and the E.B. Beni). In addition to these, the Andean valleys' dry forests, the high-altitude *Polylepis* woodlands, and the ecosystems surrounding Lake Titicaca are mostly unprotected.[60] In addition to these areas managed by SERNAP, some twenty other areas designated 'on paper' by different government offices could contribute to improve ecological representation. However, most of them are not actually protected, so only a few may be currently relevant for conservation. In Santa Cruz, one municipal reserve (Tucavaca) is managed to conserve Chiquitano forests and Cerrado near the town of Roboré, and one departmental area (Lomas de Arena) protects sand dunes, wetlands, and remnant Chiquitano forests in a rural area nearby the city of Santa Cruz. Other municipalities (in the Chiquitanía) and *prefecturas* (Beni, Cochabamba, Pando, Santa Cruz,) have designated ecologically important areas for protection, but usually without the resources or the capacity to manage them. Altamachi Cotacajes is potentially a very important area being established by the *Prefectura* in the Andes of Cochabamba, to be jointly managed by a local NGO with external support.[61]

Many nationally important wetlands are included within protected areas (e.g., Andean lagoons in Avaroa, the Pantanal in San Matias and Otuquis, flooded forests in NKM and Isiboro Secure), but a few other ecosystems still need attention. Highly seasonal systems such as Laguna Concepción in Santa Cruz, and the flooded forests and savannas of Beni and Pando should be managed accordingly to their ecological importance. The declaration of these as RAMSAR sites (as it is the case of L. Concepción) could also contribute to their conservation. Also, large cattle ranches and communal indigenous territories may significantly contribute to protect terrestrial and aquatic ecosystems. This can be done by declaring private reserves and implementing sound management plans that integrate resource use and biodiversity conservation in the properties.

60 *Estrategia Nacional de Biodiversidad*. 2001.
61 USAID Environment Concept Paper. 2002.

Map 4. Threats to Protected Areas in Bolivia



5.2 SERNAP and the Administration of SNAP

The legal framework for SNAP was established by Environment Law 1333 of 1992, while the administrative procedures were detailed later in 1997 by a supreme decree (D.S. 24.781. 31-7-97). According to their ecology and current use, protected areas are categorized as parks, wildlife reserves, or areas of integrated management. Each of these areas can be internally partitioned into core zones, internal buffer, traditional use, or resource management areas. SNAP areas are managed by SERNAP directly or through joint administration with NGOs and indigenous organizations. SERNAP is a technically and administratively independent office assigned to the MDSP. Its central office is in charge of dictating policy and norms for SNAP, and it has technical and administrative staff and consultants. Each protected area has a director and a chief of protection selected on technical merits, plus park guards and administrative personnel. In addition, each area assembles a participative management committee (*comité de gestión*) to develop and approve the area's strategic management plan, annual operation plans, and proposed projects. This institution promotes the participation of local governments (municipalities, OTBs, indigenous organizations), communities, and private sector representatives in the management of the areas.

Management committees are necessary for the development and implementation of the areas' management plans. Some protected areas have active committees and approved management plans, and a few are even reviewing the plans after years of implementation (e.g., Noel Kempff Mercado). Other areas have neither committees nor management plans (e.g., Carrasco, San Matias) and are threatened by conflicts with pre-existing communities or new immigrants. All protected areas in Bolivia have local communities within or around their perimeter (about 1.5 million people, indigenous and others, mostly in poverty). SNAP's areas such as Kaa Iya, Isiboro Secure, Pilón Lajas, and San Matías overlap in some degree with recognized indigenous territories, and in the two first cases the administration of the area is shared with the indigenous group (Guarani-Izoceño in Kaa Iya, and Trinitario in Isiboro Secure). In other cases, communities and TCOs participate in the management committee of the area, and often their members become park guards or develop productive initiatives such as ecotourism, organic farming, or others in coordination with area administration. SERNAP's personnel, however, should improve their capacity to work with local actors on issues of participative development, conflict resolution, and environmentally friendly productive systems.

5.3 Funding Sources for SERNAP

Funding for SERNAP and its protected areas has depended almost exclusively upon international donors. Nevertheless, poor coordination has often caused temporary lack of operational funds and serious deficiencies in management of these areas. Currently, 95 percent of the funds come from foreign aid: GEF, World Bank, the Swiss, Dutch, Danish, US and the British, among others, and they include a trust fund of about US $16 million. Projections for years 2001-2016 show a progressive decrease in international funds and an increased dependency upon locally generated funds. Sources of local funds could include the National Treasury, entrance fees, ecotourism, and environmental services[62]. In order to benefit from these sources, SERNAP would have to make important institutional and legal changes. These changes should be considered in the new SNAP master plan and in the new law on protected areas under development.

5.4 Management of Non-SNAP Areas

Most areas not managed by SERNAP are left unprotected. There are, however, a number of NGOs that control important areas outside of SNAP: *Fundación Patiño*/*Prefectura* Santa Cruz (*Lomas de Arena*[63]), FCBC/*Municipio de Robore* (*Tucavaca*[64]). New laws on decentralization also mandate that municipalities

62 SERNAP. 2002.
63 MHNNKM. 2001.
64 FCBC. 2002.

manage their natural resources and protected areas. Municipalities, however, lack both technical and financial capacity to complete this mandate, with a few notable exceptions where municipalities partner with NGOs. Training and financial support to municipalities are priority actions, if municipalities are to enforce the law.

A departmental service for protected areas in Santa Cruz is currently under consideration. This would seem to be an innovative idea and needs further study. Funding for this service is yet to be defined, and the participation of local institutions is a very important issue.

5.5 Framework for the Use and Conservation of Wildlife and other Biological Resources

5.5.1 Legal and Institutional Framework

The *Direccion Nacional de Biodiversidad* dictates policy related to biodiversity. The *Prefecturas* are in charge of enforcement. The Wildlife Law of 1975 has been supplemented by various new regulations. In 1987, hunting and commercialization of all wildlife was banned, with the exception of subsistence hunting by local communities and scientific research. In 1999 bans were lifted to allow utilization and trade of *yacare cayman* skins (*Caiman yacare*) and *vicugnas* wool (*Vicugna vicugna*).

Other relevant legislation includes the CITES convention, which regulates trade in threatened wild species, and the Andean Nation Community Decision 391 which regulates access to genetic resources. In this law, Andean countries regulate the trade of genetic resources and prohibit their commercialization without prior consent of regulatory bodies. The application of this decision is complicated and confusing. Attempts to legally export live animals and plants usually fail. On the other hand, illegal trade of wildlife persists, generating considerable economic returns to animal traffickers.

Unfortunately it is very difficult to control the utilization of biological resources, as enforcement institutions have neither prioritized nor funded these activities. By increasing the participation of local communities and development institutions in the management of biological resources (in particular wildlife), law enforcement could be improved. Also, new laws to regulate wildlife are needed. Sport fishing and hunting, for example, are not regulated.

5.5.2 Economic Importance of Non-timber Forest Products

These include medicinal herbs, honey, fruits, plant fibers, tannins, dyes, nuts, insects, and game animals. These products are sold locally and internationally. They are also used extensively by Brazil nut harvesters, loggers, and rural communities to supplement their diet.[65] However, little is known about the volume taken in the wild or sold in the markets. Nevertheless, wildlife seems to be a very important resource, especially for indigenous and rural communities.[66] Without further knowledge, it will be difficult to manage these resources for economic gain.

In past decades, trade in wildlife products was very important economically. The trade of parrots and macaws for the pet trade and monkeys destined for biomedical research flourished in the 1970s and 1980s. Black caimans, giant river otters, ocelots, margay cats and several monkey species were hunted and traded heavily and populations were seriously reduced in several areas. Bush meat (mainly armadillo and *paca*) is also found in roadside restaurants. Pressure from hunting associated with forestry extraction and the sale of skins and pets on the international markets is depleting game supplies. As a result, rural communities find it increasingly difficult to supplement their diet with bush meat. Finally, sport hunting and fishing is evident from the presence of

[65] Townsend and Rumiz. 2002.
[66] *Estrategia Nacional de Biodiversidad*.2001.

hunting and fishing clubs. Ducks*, tinamous*, doves, wild pigs, deer, catfish, *pavón* bass and other game fish are targets for many hunters and fishermen. Although many laws exist, hunting is generally uncontrolled. Many wild animals, some of them almost extinct, are caught and traded internationally.

Fortunately, local NGOs and indigenous groups have initiated studies on the management of several wildlife species and other non-timber forest products. DFID and CIDOB have collaborated with a number of indigenous groups to work in the management of cayman populations, wild fruits, medicinal plants, and plant fibers for handcrafts, among others.[67].

WCS is working with the Guarani in the Chaco and the Tacana in northern La Paz to plan management activities in these areas. The Museo NKM helped Chimane and Moseten communities in Pilon Lajas to monitor their wildlife harvest.

The National Strategy of Biodiversity promotes the management of biodiversity for income generation. A bio-commerce strategy is also under development. However, these plans will do very little to prevent the overexploitation of biodiversity if they are not accompanied by a control program. Last year, the MDSP authorized the harvest of 46,500 cayman skins. Although no official data exist, people working in the area estimated that harvest more than doubled the authorized figure[68]. Conversely, an innovative initiative to export orchids produced in vitro was not approved because of the restrictions established in Decision 391.[69]

5.5.3 Ecotourism

Tourism generated almost 180 million dollars for Bolivia in 1999. This is approximately 1.6 percent of the average 1988-1996 GNP. Currently, ecotourism activities are being developed in selected protected areas with the participation of indigenous groups and rural communities. Conservation International worked with the Tacana communities to develop a tourist center in Chalalán, Madidi National Park. The Museo NKM helped the community of Florida to improve infrastructure and organize guided tours in Noel Kempff Mercado Park. The potential of these activities is still underdeveloped[70].

The International Resource Group (IRG) evaluated the potential for ecotourism in four important protected areas: Chaco/Kaa Iya Del Gran Chaco National Park Area, the Amboro National Park Area, the Chapare/Carrasco National Park Region and the Sud Yungas/Cotapata National Park Area.

IRG concluded that "it is clear that ecotourism can play a role as a supplemental economic activity. It has the potential to create full and part-time jobs and provide work for both men and women at a variety of skill levels. In particular, the part-time positions fit well into a rural lifestyle and if patterns experienced in other countries hold, women will make the largest gains in part time work." On the other hand, IRG goes on to say that 'although ecotourism can generate employment opportunities it should not be seen as a widespread replacement for existing economic activity, especially traditional coca production. Furthermore, creating Bolivia's competitive edge in ecotourism will require investment in product development, human resources and basic infrastructure. Levels of human settlement and the presence of indigenous peoples are further dimensions that differentiate the four regions from one another and must be taken into consideration when planning and executing ecotourism. In terms of the international ecotourism market, Bolivia is still undiscovered and underdeveloped. For the most part its products are unknown. Therefore, if Bolivia is to penetrate the world marketplace it is critical that a marketing program be established and that a quality sustainable product is offered. To successfully do this, mechanisms like product certification, human resource development programs, and investments in basic community infrastructure are required.

67 Townsend et al., 2001; CIPTA/WCS, 2002.
68 J.L. Santivanez, personal communication.
69 Dr. P. Ibisch, personal communication.
70 *Estrategia Nacional de Biodiversidad*. 2001.

Summarizing, IRG writes, "across all four regions it is clear that common needs include investment in basic infrastructure—potable water, electricity, roads, communications, health services and community amenities including plazas, parks, and urban design. These physical infrastructure investments need to be complemented with investments in human capacity in the area of hospitality including guide training, small business operations, marketing, and attraction management. Investments in any of these areas provide dual benefits to local citizens and travelers alike".

Finally, the ARD Team feels that despite current bans on using wildlife and hunting, sport fishing and hunting could provide benefits to local entrepreneurs and indigenous populations. Local fishing and hunting clubs are active but the pay no sports fees. Tour agencies bring in foreigners to fish and hunt, but are under little control. New fishing and hunting regulations and mean to apply these laws seem needed.

5.6 Main Issues and Strategies

There are several threats to the conservation of biodiversity in Bolivia. Confused legislation, weak institutions, and poor coordination seem to be the most critical. In addition, the lack of education and awareness in biodiversity further limit chances to move forward in the design and implementation of management activities. Biodiversity should be managed for its many benefits. By increasing numbers of wildlife, food security of indigenous populations and rural communities could be improved. Cultivating medicinal plants could be a valuable source of income. Protecting watersheds would sequester carbon and secure water supply.

Mining and oil and gas production in some places threaten Bolivia's biodiversity. Inadequate waste disposal from tin mines is a serious source of contamination to some Andean rivers such as the Pilcomayo, directly affecting aquatic biodiversity. New road construction scheduled for central Bolivia to increase trade with Peru and Argentina will stimulate growth in this once isolated region, putting new pressure on biodiversity. Oil prospecting represents a threat to biodiversity mainly through habitat fragmentation caused by infrastructural requirements associated with prospecting and extraction. Similar threats apply also to gas extraction, especially since exploitation of hydrocarbons and gas is given high priority in Bolivia, even within national protected areas.[71]

The ARD Team has developed and proposes the following strategies to address some of the challenges to biodiversity conservation.

- SERNAP has many limitations, most important of which is the lack of government funding. Donors are now supporting SERNAP, but this support does not necessarily promote the sustainability of the institution. Providing technical assistance to strengthen SERNAP's technical capacity would do more to promote its sustainability.
- SNAP's development master plan would allow biodiversity management to function more efficiently. Important components of SNAP's plan are preserving unique ecosystems and strengthening the technical capacity and institutional stability of SERNAP.
- Colonists and coca producers are invading some protected areas. More control is needed, but the responsible institutions are weak. Getting local communities involved in coca control would help, as would strengthening the institutional capacity of these institutions.
- Laws on mining and hydrocarbons take precedence over the decrees related to protected areas. This clearly leads to conflicts with biodiversity management objectives unless a legal means is established to evaluate the tradeoffs or on a case-by-case basis.

[71] At the time of its construction, the gas pipeline from Santa Cruz to Brazil, which traverses forest ecosystems, was a source of controversy and conflict.

- Banning hunting is not a solution, management is. By improving management capabilities of local institutions, forest and hunting associations can contribute to increased revenues generated from wildlife.
- Illegal trade in wild animals and plants persists. It is impossible for *Prefecturas* to control this trade. The legal and sustainable production of important export species could help to reduce this problem.
- Indigenous groups and rural communities lack the capacity to develop and implement sustainable management plans. Providing technical assistance to teach these communities to do so is a high priority activity.
- Bolivia has genetic resources of great importance, but their legal production and sale is prevented because of confusing laws and weak institutions.
- People live in protected areas and this creates a number of conflicts related to land tenure. INRA has only a limited capacity to help with this situation. One solution would be to increase participation in solving land issues.

Bolivia is signatory to a number of international agreements on biodiversity. CITES, the Convention on Biodiversity, and the Convention on Desertification support Bolivian efforts to conserve and manage its national resources. CITES helped Bolivia control exports of threatened plants and animals, and improved chances to prevent species extinction. The Convention on Biodiversity led to the institutionalization of SNAP and promoted donor financing for protected areas.

Desertification is a real problem in Bolivia. Some 12 million hectares of forest burned in Santa Cruz during 2001. In addition, farm productivity in the highlands continues to decrease. The Convention on Desertification has brought new techniques on preventing erosion, controlling deforestation and improving soil productivity.

TNC operates an important carbon sink program in protected areas. However, carbon sequestration from existing forests is no longer a part of the Clean Development Mechanism. Currently, carbon credits can only be earned through tree planting. Unfortunately, tree-planting programs in the Bolivian highlands have decreased in recent years, but the potential is still there. Renewed emphasis on tree planting seems appropriate.

6.0 Community Forestry Development

The phrase "community forestry development" is rather ambiguous. What does it really mean? By defining each word in this phrase, a practical definition can be constructed.

- **The Community**: Ethnic groups that have a long tradition of making decisions by consensus. Men, women and children participate in forming this consensus.
- **The Forest**: Trees have provided communities with medicine, food, forage and wood for a long time, while also protecting them and their source of water. Most communities would like to see this continue.
- **Development:** This widens the range of options for people, offering to improve educational opportunities, health and medical attention, water for drinking and irrigation, agriculture and forestry practices, shelter and employment. It embraces the total spectrum of human options, from physical surroundings to economic and political freedoms.

In synthesis, community forestry development refers to the activities involved in community management of renewable natural resources. These activities share the objective of improving the social, economic and emotional conditions of the rural communities, based on their own realities and seen from their own perspective, with the wise use and sustainable management of natural resources. [72]

The Team visited three community forestry development programs supported by USAID: the Management, Conservation and Utilization of Natural Resources in the Tropics of Cochabamba Project in Chapar Jatun Sach'a, the BOLFOR Project in Santa Cruz and Project Concern International in the high valleys in the Department of Cochabama. The social, economic and environmental condition of each project differ substantially, nevertheless all of these projects have made notable advances in reaching community forestry development goals. Stakeholders interviewed by the Team strongly support these projects and would applaud a decision by USAID to continue its support of community forestry development.

6.1 The Jatun Sach'a

This project was originally financed by USAID-AD, UNDCP and VIMDESALT and is now fully funded by USAID. Its official aim is to "control the supply of narcotics drugs and psychotoropic substances" and it does this by helping farmers implement licit development activities. It has successfully organized colonists to design and implement integrated forest management and agroforestry development activities.

Jatun Sach'a is a very advanced and progressive project. Project personnel have successfully assisted farmers in establishing associations dedicated to implementing a multitude of licit development alternatives that generate real income in the short, medium and long term. These development alternatives include forest management, commercialization of wood and non-timber forest products (NTFPs), integrated management of farm plots through the promotion of a variety of crops, the implementation of agroforestry practices, silvipastoral systems, and fast growing tree plantations.

There are many reasons why this project is successful, and although ARD was not contracted to evaluate this project or any of the other field activities financed by USAID, members of the Team felt compelled to comment on the dedication and strict adherence of project staff to the basic principles of participatory development: transparency, respect and equality. Briefly stated, the project seeks to help farmers become self-reliant. To achieve this aim, project personnel implement, with care and dedication, participatory methodologies assisting farmers to:

[72] This definition comes from the book *Pioneering Change* written by C. Jordan, M. Andrade, A. Añasco, and C. Herz. Chapter II. 2002. It stresses the fact that forests are used to improve the livelihoods of rural people.

- Reflect on their situation;
- Look for solutions to their needs;
- Form community development committees;
- Use participatory decision-making methodologies;
- Assume ownership of project activities;
- Successfully solicit additional external support;
- Plan and implement projects;
- Increase cooperation, solidarity and cohesion;
- Stimulate individual commitment to the group; and
- Develop an entrepreneurial spirit**.**

Due to their participatory spirit, project personnel have gained farmers' admiration, trust and respect, farmers strongly support project goals, and thus vigorously participate in the execution of project activities. This is a sure formula for success in any community development program. ARD Team members would like to congratulate all project staff for their hard work and dedication. Congratulations also go to those who have mustered and continue to gain the political and financial support for this innovative development project.

The Project Directors have concluded that this is a crucial time for the project, and they have started to elaborate an "exit strategy" aimed at promoting the sustainability of the extension methodologies and productive systems being implemented. To aid this process, three elements are suggested for possible inclusion in this exit strategy.

The first is networking. This simply means empowering local development organizations to execute extension programs that promote and expand on licit productive alternatives started by the project in a sustainable and effective manner. Fortunately, the project has contacted a number of local organizations, but coordination between these organizations is still weak. Here too, incentive programs and extension methodologies varied considerably from one organization to the other. As a result, farmers received mixed messages, which confused and disorientated them. Basically, the problem was a lack of communication, compounded by mixed definitions of participatory development. Through networking, it would be possible to build up common development strategies, determine roles and responsibilities, and design and implement common extension procedures. If properly done, networking would build constructive alliances, improving the effectiveness and efficiency of all entities involved, including those farmer-driven organizations.

A few of Jatun Sach'a's key personnel should visit other development programs more experienced in networking, such as the community forestry development programs conducted by FAO and the Canadian/Ecuadorian Foundation in Ecuador.

Secondly, a detailed analysis of the project should be conducted to determine lessons learned. For the last five years, the project has been caught up in a whirlwind of activities, and it seems that project personnel have had little time to reflect on the methodologies, technologies and other development tools they have created. Such knowledge is of utmost importance to schools, universities and to current, as well as future, development programs. Of special interest is the project's extension system. Truly participatory, the methodologies and technologies used here promote self-reliance rather than dependency. In short, the project has a lot to offer, but for this information to be assimilated by others, it must be properly packaged and distributed.

The project should expand its reach two-fold, for two reasons. First, the demand by colonists for project services has increased dramatically in the last two years. Having learned of the benefits generated by the project from their neighbors, new potential participants visit the project office daily to present requests for assistance. To not satisfy this demand would be extremely counter-productive to alternative development goals set in the region. Secondly, there are still many other hard core problems in the Tropics of Cochabamba in which the project can help. For example, the Carrasco National Park is being invaded by new colonists, some of whom are growing coca. If this park is to be preserved, urgent steps are necessary. One possible measure is the creation of a protective buffer zone in which the project could help farmer colonists establish licit productive activities in much the same way it has in valley. Integrated farm management, however, can not in itself prevent further encroachment and illicit activities in the park, unless, of course, it is accompanies by effective education and enforcement measures.

Once again, Jatun Sach'a is an outstanding project. It has successfully prepared farmers to improve their livelihoods through the implementation of forestry, agroforestry and other alternative development opportunities, keeping coca off their lands. Continued political and financial support to the project will produce a multitude of impressive benefits, for the people, Chapare's tropical forests and the Bolivian nation.

6.2 The BOLFOR Project

BOLFOR's main goal is the sustainable management of tropical forests in the Department of Santa Cruz. In its second phase, this project has developed an impressive array of management tools and institutional strategies that have successfully supported the application of Bolivia's Forestry Law. Project staff can also be proud of their advances in certification, fire control, and forest research, among others.

Seeking to implement forest management plans for ASLs and TCOs, the project has chosen to work with a number of indigenous groups (*Chiquitanos, Guarayos, Yuqui-Yuracaré, Tacanas, Araonas,* and *Yaminaguas-Machineri*), and is in the in the process of establishing several community forest and non-timber forest enterprises. Although very important to these communities, these enterprises do not satisfy community needs of health, food security, organization and leadership.

As the BOLFOR project is scheduled to terminate at the end of 2003, the ARD Team recommends that new project dealing exclusively with community forestry be implemented. Because of its focus on human development, this project would differ greatly from BOLFOR. On the other hand, the technologies developed and lessons learned in BOLFOR, could greatly facilitate project implementation. Ideas for the new project are presented in Box 2, on the following page.

6.3 PL-480/Title II, USAID's Food Security Program

Title II funds have been heavily invested for food security in the Andes. Support has been focused on increasing agricultural productivity, food for education, maternal and child health, community water and basic sanitation. In 2002 a new DAP was adopted that focuses Title II funds on three areas: rural incomes (agriculture), health (maternal health, child health, community water and sanitation) and natural resource management. The percentages of Title II funding for these programs are 39 percent, 42 percent, and 14 percent respectively with four percent overhead.[73] The addition of natural resource management into the Title II program opens the door for true integrated resource management and community development. To successfully integrate natural resource management into projects, it is necessary to work closely with communities to develop community forestry projects focused on their local micro-watershed. Furthermore, community workshops should be held to identify issues and priorities. Projects should then start by focusing on those issues. Finally, the health SO

[73] Personal communication with Daniel Sanchez-Bustamante, USAID/Bolivia.

should coordinate with the Environment SO and recommendations for successful community forestry projects outlined later in this document.

Box 2: Community Forestry Development in Santa Cruz

Community Forestry Development in Santa Cruz

The objectives of this suggested project are given below.

General Objective: To improve the livelihoods of indigenous communities through the sustainable management of tropical forest and farm lands.

Strategic Objective 1: traditional community organizations strengthened for development.

Strategic Objective 2: food security for the community based on integrated farm and wildlife management programs and home garden.

Strategic Objective 3: community forestry wood-based enterprises up and running smoothly.

Strategic Objective 4: community forestry non-wood forest product enterprises up and running smoothly.

Strategic Objective 5: tropical forests sustainably managed for wood and non-wood forest products

To accomplish these strategic objectives it would be necessary to implement a rather large participatory extension program. The sustainability and cost/benefit ratio of extension could be improved through outsourcing of major activities. These activities include:

- Training of extensionists and community leaders in participatory development strategies.
- Developing training and promotional materials.
- Increasing farmers' participation and analysis in the planning of natural resource programs.
- Improving participatory methodologies to help communities bring about democratic and self-reliant development.
- Improving productive technologies promoted to increase the environmental and economic benefits to farmers.
- Further developing community forestry and related enterprises to improve the farmers' income.
- Increasing women's participation and the benefits they receive from community forestry development.
- Promoting the preparation and training of community leaders in natural resource management.
- Assisting in modernizing the educational curricula of universities interested in community forestry development.
- Promoting alliances between development agencies for the advancement of community forestry development.
- Implementing awareness programs to promote the understanding and benefits of community forestry development.
- Ensuring modifications in national, regional and local rural development policies to favor community management of natural resources.

Such a project could be implemented in three phases of five years each: Phase I--- the development and validation of participatory methodologies and productive systems, Phase II—the expansion and consolidation of community development work programs, and Phase III—networking and institutionalization of community forestry development extension programs. Funding for this project is estimated at between US $ 25-30 million over a period of 15 years.

One example of how Title II could be used for community forestry is illustrated in the following example from PCI. PCI received Title II funds to implement an integrated community forestry project in the high-valley community of San Miguel consisting of 150 families in the Department of Cochabamba. This indigenous community is located next to Tunari National Park. The project was initiated in a rather sparse *Polylepis* forest to help protect an endemic bird species and other animals, to protect the watershed, and to provide a continuous supply of *Polylepis* for its medicinal properties. The project helped to start a community tree nursery for *Polylepis*, built a community water system and a stable irrigation system, and implemented agroforestry systems. The community was trained on every aspect of the management of the tree nursery and on the planting

of trees. School children received education about their environment. The community forestry development program stressed the importance of watershed management and restoration for a continuous water supply. Watershed management and restoration also has the effect of preserving the endemic bird species and minimizing the flooding of Vinto, a community in the lower part of the watershed.

Although PCI has not received funding to continue the San Miguel project, the integrated nature of the project has allowed the community to continue managing the tree nursery and the planting of trees. This project is successful for several reasons. First, the community traditionally practices participatory decision making and came to a consensus that watershed protection is a community priority. Second, Title II funds provided an incentive to the community for work and helped purchase supplies needed for the water system, irrigation system, and tree nursery. Third, local leaders were in charge of the project. Fourth, education activities were conducted in the school. Finally, the community was able to see the benefits of their efforts. The community is hoping to increase their income and food security by selling fruit from the agroforestry systems implemented and by selling trees from the tree nursery to PCI or other communities. The community is also hoping to be able to generate income from ecotourism activities in the National Park.

USAID/Bolivia should prioritize community forestry development programs in its strategic development plan. Prioritization would allow USAID to focus on key issues affecting the sustainability of these programs. These key issues are discussed below and are not exclusive to community forestry development, but are directly related to rural development activities in general.

6.4 Key Issues Affecting Community Forestry Development

- Strong Community Leadership. Successful community forestry development projects require strong local leadership that helps educate and unite the community around community forestry development objectives. This leadership can either be a strong local personality, a local NGO, or an existing local community group. Perhaps the most important aspect of strong community leadership is that it creates sustainable projects. An example of this is illustrated by the TCO Santa Maria in Santa Cruz. The community indicated that sustainable forest management was introduced by one local person and that the entire community agreed that it would be to their present and future benefit to form a TCO to sustainably manage their forest. They indicated that one difference between their community and other communities that do not sustainably manage their forests was the fact that they had a strong local leader.[74]
- Public Involvement and Participation. This issue has to do with involving the entire community in the development, implementation, and evaluation of community forestry development projects. This implies that men, women, and children are involved in all aspects of any project. It also implies that outside organizations provide opportunities for the community to express themselves and they should listen to what the community really wants. Advanced participatory methods should be created for all aspects of community forestry development projects. For example, many comments from various communities indicated that money from community projects should be used to improve public works like water systems, health posts, and education. Other things that various communities said they want from community forestry development projects include jobs, the continued existence of wildlife, a source of medicinal plants, a place to educate their children and finally, that the forest would continue into the future.[75] Using participatory methods allows community desires and needs to be incorporated into community forestry development activities. A recent evaluation of the DDCP project indicated that the DDCP participatory model could be applied to the forestry management issue.
- Policy and Incentives. This issue has to do with the need to have policy and incentives in place for community buy-in and participation in community forestry development projects. The following is a list of

[74] Information received by community members during field visit to the Santa Maria TCO in Santa Cruz.
[75] Information received by community members during field visits to TCOs and ASLs in Santa Cruz.

policy changes and incentives that USAID should focus on to help in the implementation of community forestry development projects.[76]

- Prioritize local community management and control of natural resources.
- Support Bolivian public institutions with the creation of laws and regulations that favor participatory development and community forestry programs.
- Support local organizations that use participatory development programs.
- Support the incorporation of participatory concepts and methodologies in university programs.

- Networking and Coordination. For any successful community forestry development program the NGOs, *Superintendencia Forestal*, Municipalities, ASLs, TCOs, local community groups (Mother's Clubs, agricultural cooperatives, schools, etc.) all need to work together. Networking and collaboration should center around common objectives. Once common objectives are agreed upon, roles and responsibilities need to be assigned to each group. There should then be regular meetings to see what things everyone is doing, how they are doing it, and problems they are having so they can be solved by the group. Networking also includes sharing relevant information with each group and using existing projects to show others how similar objectives can be achieved. For example, Forest Management Plans need to be integrated with national, regional, municipal and community development plans, as well as integrated with protected area plans.

- Institution Building. There can be no sustainable development with out sustainable institutions. As has been shown, community forestry requires the involvement of government institutions, NGOs, universities and farmer organizations. There have been many attempts in the last two decades to improve the effectiveness of these organizations in negotiating, supporting and implementing community forestry projects and rural development in general. In the 1980s, for example, the German Agency for Technical Cooperation (GTZ) trained the staff of local institutions throughout the Andes in the methodology known as Planning by Objectives. Other agencies have offered training in the methodologies called Strategic Planning and Community Participation. Community forestry projects themselves have trained people in participatory methodologies and productive technologies related to community management of natural resources. Although these activities have helped, they have not been sufficient. Strong local development organizations are still rare.

  USAID has a critical role to play in strengthening local institutions for development. The institutional sustainability triangle can be used to help local development organizations become self-reliant in the operation of community forestry extension programs. The three sides of this triangle can be described as follows:

  - **Orientation** encapsulates the broad direction of the organization.
  - **Capacity** refers to its particular technical or managerial strengths.
  - **Credibility** reflects the validity and transparency of the organization's efforts, as seen by its clients.
  - Finally, **Human Resources** lie at the center of the sustainability triangle. The worth of an organization is the direct product of its human resources and their problem-solving abilities.

- Integrated Resource Management. This issue recognizes the fact that community forestry development projects are really integrated community projects that involve forestry. That is, these projects are not just about managing trees, they are about sustainable management of communities. All community forestry development projects should incorporate education, training, and one or more of the following aspects.

[76] Information taken from Chapter VIII in *Construyendo Cambios: Desarrollo Forestal Comunitario en los Andes, Una propuesta de manejo participative de los recursos naturals renovables para el Nuevo Milenio*.

- Fish and wildlife. Using forestry practices to manage fish and wildlife for the benefit of local communities. Viable wildlife populations increase a community's sense of place, provide subsistence hunting and fishing, and provide ecotourism opportunities.
- Agroforestry. Using Agroforestry techniques, communities will be able to produce food in a sustainable manner while protecting and restoring water and soil resources. Under some circumstances, credit for the carbon stored within the trees and soil of these systems may be traded on international markets.
- Integrated Farm Management. This involves sustainable management of livestock, agroforestry, micro-watershed management, composting, and reforestation.
- Water Projects. These projects include both drinking water and irrigation projects. The focus should be on watershed management and incorporation of forestry activities that protect and restore the local watershed.
- Road Construction. Road construction should incorporate forestry activities to minimize damage to water quality and reduce road maintenance costs.
- Health. These projects include sanitation, nutrition, disease prevention, and health posts and could be coupled with agroforestry projects, home gardens, and watershed management by using Title II funds.

- Equity. Community forestry development considers equity as a goal of human development. It promotes equity among human groups that have formerly been differentiated on the basis of age, wealth, sex and culture. Certain forms of inequity have played a leading role in undermining social cohesiveness. Cultural inequity, for example, has impeded the free and just development of many local cultures. Economic inequity has excluded many rural farm communities from actively participating in the national economy. Gender inequity is still common in Andean Countries. To meet new circumstances successfully, such as globalization and economic growth, and to develop the full potential of women as well as men change is necessary.

- Gender. Equality of the sexes is fundamental to development. Community forestry consciously attempts to promote greater equality between men and women by removing barriers of discrimination. Women are, therefore, given special opportunities to increase their skills and participate as equals in the development process. The objective of gender equality gives community forestry a human as well as an economic development goal. Community forestry is changing the established community power structure. Although community forestry promotes equality of men and women, it recognizes that they may have different roles. Thus community forestry development plans include both men and women, but according to the roles they assign themselves.

  The methodologies for working towards gender equality developed in community forestry help women express their natural creativity. They do not, however, attempt to divide the sexes, but rather to unify them by making their strengths complementary. The gender focus goes beyond the division of labor to make gender equality understood in all facets of daily life. From gender equality emerges an innate human respect for human rights and equity.

- Marketing, Financing and Business management. Communities often do not have the expertise needed to successfully manage forestry related businesses, market their products, and find financial assistance. Marketing for NTFPs, all aspects of local business management, improvement of the utilization of waste wood (*disperdicios*) both in the forest and at the sawmill need assistance. For example, there have been some contract problems between lumber companies and the TCOs, including late payments for wood delivered, which has caused problems with several community groups. Furthermore, it should be noted that there has been some progress in the breaking of several monopolies in various aspects of timber harvesting. For example in Yotaú, a group entered the market and offered far better prices for wood products, thus changing the local market. Also there have been changes in the railroad tie market in the Chiquitania.

- Sustainable Management of Small Forested Areas While there has been much of work accomplished on sustainable management of large forested areas, little support has been given to small tracts of land (<200ha). Generally, TCOs and ASLs are located between 30 and 120 kilometers from the communities that

are managing these lands.[77] Sustainable management of small forested areas should be incorporated into integrated resource management activities both at the municipal and farm levels. During field visits in the Department of Santa Cruz, several local people expressed a desire for assistance in the sustainable management of small areas.

- Sustainable Management of Large Forested Areas Support for sustainable management of large, not easily accessed tracts of land with small community groups (ASLs and TCOs) should continue. Also, the condition of the land being managed by these community groups should be taken into account when designing community forestry development projects. For example, during the field visit to Santa Cruz, much ASL and TCO land was previously under concessions to private timber companies and has been previously cut over or high graded. This has an impact on the amount and type of wood that can be harvested and directly impacts the amount of money that can be generated.
- Land Tenure This issue has to do with the lack of clear land tenure that causes many conflicts inside and outside of communities. Colonists without land title, overlapping forestry concessions and unclear land ownership are all part of this problem. INRA is working with land tenure problems, but the job is immense. Innovative ways of handling these problems should be found. Out-sourcing land tenure dealings could be one option. WCS has found that by involving interested groups in the field work, they have significantly lowered costs of clearing land titles. This type of collaborative work should be explored.
- Result Oriented Projects. Projects should focus on results and be centered on local resources, forests, local farms, municipal and private protected areas. Community forestry development projects should focus on communities that have the greatest chance for sustainability and success. By focusing on a few projects and achieving success, projects can be started in other communities and successful communities can help. This strategy builds upon the results achieved by one community and replicates it in other communities.

[77] Information received from community members during interviews with various TCOs and ASLs in Santa Cruz.

7.0 Environmental Education and Communication

7.1 The Education Reform Process

Education Reform began in Bolivia 1995 with the Transformation Program. To date, advances have been made in core curriculum development and in teacher training through academic assessors. However, while this training remains insufficient because of its brevity and lack of inclusion of environmental topics, Education Reform is planning to begin an environmental training program for teachers within the next year. Although specific biodiversity contents are not introduced, life sciences are taught with an ecological focus.

One of the proposals of the Education Reform, yet to be addressed, is the development of diversified branches for the inclusion of specific environmental, cultural, and development contents at the regional level. In this sense, interesting experiences have been developed by the Ivi Iyanbae Foundation and WCS, with schools in the Alto and Bajo Izozog, and by the Noel Kempff Mercado Natural History Museum with schools of Amboró National Park and Natural Area of Integrated Management. In both cases, these experiences included development of curriculum, teacher training, educational activities related to biodiversity, and the development of educational materials related to wildlife conservation (Salinas, E. y M. Quiroga, 2000).

7.2 University and Technical Training for Biodiversity Management

Undergraduate courses in biology are available in the departments of La Paz, Santa Cruz, Cochabamba and Pando, and forestry is taught in Cochabamba, Santa Cruz, Riva Alta, and Tarija, with approximately 449 titled professionals throughout the country: 201 biologists and 248 foresters. There is also a forestry school in Riva Alta that graduates approximately 10 students per year, 50 percent of them are women. However, there is a dearth of human resources specialized in biodiversity and forest management. The offer of master-level courses related to biodiversity themes is just beginning. The largest contribution in the academic arena has been through pure and applied research; the development of scientific animal and plant reference collections, some of them with an emphasis on species with a potential for forestry and agroforestry use (Departmental Herbarium of Chuquisaca); the creation of in situ germoplasm banks and the development of human resources for natural resource planning and management (ENCB, 2001).

International programs have contributed to improve academic training by guiding and funding thesis studies on ecology and conservation. Programs such as WCS's in La Paz and Santa Cruz are associated with local universities UMSA and UAGRM and have trained professionals later involved in conservation projects.

In relation to training of technical staff for conservation activities, the largest efforts have been developed within SNAP. Since 1994 training activities have been carried out through a regular training plan for park guards and through a specialization plan for directors and technical staff. At present there are 36 trained park guards and 266 park guards within the training program (Salinas, E. M. Quiroga, 2000). Amongst the themes that have merited special attention within the technical formation of protected area staff, are relations with the local population, concepts and tools pertaining to the promotion of social participation, and environmental education.

Universities have a five-year degree program in communication. There is no Master's Degree program, but after graduation, students can specialize in audiovisual communication or public relations with some marketing course-work. However, these skills have not been systematically applied to environmental communication.

Central actors for biodiversity management are municipal governments. However, they still lack the necessary capacities to assume the whole range of responsibilities that are assigned to them by law, especially those relating to natural resource management.

BOLFOR has carried out technical and administrative training activities with municipalities, has advised ASLs, TCOs and private concessions on the development of forestry management plans in Santa Cruz, Beni, Pando and northern La Paz. Although these efforts have contributed to better forest management, they have failed to strengthen the organizative structures of ASLs, forestry associations and TCOs, and to create capacity for project design and negotiation, harvest, transformation and sale of timber and NTFPs.

7.3 Experiences in Environmental Education and Communication

Since the mid-1980s several academic and environmental institutions, namely CIEC, PROMETA, FAN, National Museum of Natural History, Noel Kempff Mercado Natural History Museum and UNAMAZ, have been carrying out efforts to inform and raise awareness though environmental education activities such as courses, workshops, campaigns and educational materials. However, these activities have failed to have the desired impact because of the following problems:

- In general, environmental education experiences have been isolated with not enough continuity between them.
- Appropriate educational methodologies for different levels of instruction, social characteristics and cultural characteristics of the focus population have not been developed. Hence reflection and concrete action have not been promoted. The vast majority of educational materials developed have been printed and their usefulness is questionable.
- Lack of coordination and linkage between the various educational experiences has made the ordering and continuous exchange of experiences difficult.
- EE&C objectives focus on changing knowledge and attitudes, rather than behavior (GreenCOM, 2001).
- EE&C methodologies generally do not include the steps of assess (formative research), pretest and revise, or monitor/evaluate (GreenCOM, 2001).

7.4 Threats and Opportunities

The Bolivian State has made important advances in the establishment of an institutional and normative framework for environmental management and has developed tools and processes for sustainable natural resource management. Nevertheless, topics related to biodiversity conservation are still not considered a priority in the political agenda.

The economic problems through which the country is suffering place economic and social policies in the forefront, while relegating environmental issues to a poor second. Nevertheless, the Ministry of Sustainable Development and Environment is interested in analyzing and proposing a sustainable development concept which strengthens democracy, ensures the welfare of the population and responds to the need for economic growth based on environmental conservation.

Thanks to actions taken for biodiversity conservation by both the State and the civil society, and information through the media, the Bolivian population has increasingly become aware of the importance of environmental conservation. Participation of different social sectors in the design and implementation of policies has permitted debate, exchange of ideas and information sharing. But the lack of economic opportunities, loss of cultural values and structural problems with education in Bolivia remain obstacles for the formation of citizens who are committed to the defense of their natural and cultural heritage and have the capacity to prevent and solve environmental problems. In general, the Bolivian population considers that conservation actions represent an obstacle for development. Nevertheless, they are aware of the importance of ensuring environmental quality for the maintenance of health and the provision of environmental services. According to a survey carried out by USAID Bolivia in 2001, the majority of people believe that access to clean water and air is the right of all

Bolivians, and are aware of the importance of forest conservation. This belief is in frank opposition to the unwillingness of the population to take conservation actions.

On the other hand, a recent study, carried out in Madidi National Park and Natural Area of Integrated Management on the social actors of the region (Lehm Z., H. Salas, E. Salinas, I. Gómez y K. Lara, 2002), shows that communities, grassroots organizations and local institutions have an ambivalent attitude to the protected area. While they believe that the park represents a great opportunity for the development of northern La Paz because of its tourism potential, they also feel it is a limitation for natural resource use. Similarly, they expect the park to become a source of economic benefits but are not prepared to accompany these expectations with support for conservation efforts. This is a reflection of the inadequate understanding of the importance of protected areas for the maintenance of Bolivia's natural heritage and of productive systems. It is also clear that grassroots organizations, municipal governments and local institutions are not aware of the need to take joint responsibility for the construction of a collective action project directed to the sustainable development of the region. The results of this study are similar to others carried out in protected areas of SNAP. The local population within and around protected areas has little information on the area's importance, management and regulations, and assumes that the restrictions placed on natural resource use, especially timber extractions, are against their economic interest. Nevertheless, the communities of several protected areas recognize that conservation efforts benefit them because they permit the maintenance of valuable resources that were previously unsustainably used by themselves and third parties (GRAMA, 2000).

The increase in ASLs, TCOs and forestry associations indicates that in the future these will represent the largest number of people linked to forestry production and natural resource management. Until now these activities have not been economically viable because of the lack of an integral vision for forest management, the limited experience of both professionals and communities in topics such as participatory development, wildlife management, non-timber forest product management, and project development and negotiation.

The experiences developed by environmental and academic institutions in environmental education and communication activities represent an important base that should be strengthened to deepen, systematize and amplify the actions carried out. Some domestic organizations have the capacity to design and carry out an environmental education and communication strategy at the national level, however, they need additional capacity building. It is important that such actions are framed within an environmental education strategy and that an efficient interinstitutional coordination system is established.

7.5 Considerations for the Formulation of a Strategy for Action in Environmental Education and Communication

The success of environmental education and communication in Bolivia ultimately depends on its ability to influence environmental behavior. To have any affect, environmental education and communication require a change in design and implantation. To achieve changes in the population's attitudes and behavior in relation to biodiversity conservation, we must move away from projects and isolated actions towards processes that generate efficient methodological experiences and significant social impact. This requires:

- Strengthening local organization's leadership roles as a pivot around which proposals are generated, activities coordinated and processes followed up.
- Involve scientific institutions, those carrying out educational and communication activities and those that integrate this theme into their socioeconomic development projects.
- Define an agenda of environmental topics that are of key economic and political importance.
- Develop educational and communication methodologies that revalue cultural heritage and facilitate participation and action.

- Establish a nexus for continuous work the Education Reform and other public administration entities that develop activities in environmental education and communication.
- Produce EE&C through a coordinated, participatory methodology that is based on research to support, systematize and increase departmental, municipal, community-based programs, and individual knowledge, negotiation, and action.

Educational processes should focus on informing social actors and promoting their participation in analysis and debate regarding the problems and issues affecting them. This would facilitate their understanding of reality in all its complexity, considering the interdependence of problems and processes and strengthening the use and respect of citizen's rights and obligations. This will require analysis, coordination, sharing of technical knowledge and of successful experiences in natural resource management and environmental quality improvement. In this sense, it is important to pay special attention to municipal governments so that they are able to fulfill a leading role in local management for sustainable development.

Following formative research, it is important to develop training activities directed at natural resource user groups in TCOs and *Campesino* communities. These activities should include communication of natural resource use benefits, regulations, conservation and development of proposals that generate models for sustainable use of natural resources, their validation and communication, and the establishment of social control mechanisms.

It is important that educational activities include various social actors, following both formative research and a strategic planning exercise to define priorities, specific methodologies for interventions, and participating institutions in different parts of the country. Social actors identified include: public opinion leaders, public sector administration employees, municipal governments, grassroots organizations, natural resource user groups, school and university students and the public in general.

An EE&C strategy should include communication of scientific information and the results of management and commercialization experiences through the identification of environmental topics of political, economic, and cultural importance, such as protected area management and the importance of biodiversity conservation.

7.6 Objectives

The following objectives should guide environmental education and communication efforts:

- Link and coordinate EE&C efforts, systematize them and strengthen them, thus generating greater possibilities to influence attitude and behavior towards conservation and natural resource management.
- Contribute to the increase in technical capacity of user groups and communities for sustainable management of biodiversity resources as an integral part of productive and commercialization strategies.
- Build social capital with the commitment and ability to sustain environmental actions.

7.7 Strategies

7.7.1 Strengthen Capacity for Collective Action of Institutions Working in Environmental Education and Communication

- Organize a network of EE&C institutions to permit integration around common objectives, joint actions and a permanent process of analysis to stimulate the production of knowledge, evaluation of activities and development of future actions.

- Design a national EE&C strategy, including a conceptual base, objectives, key environmental themes (protected areas, integrated forest management, biodiversity conservation, forest fire prevention), methodological instruments, research and monitoring and inter-institutional coordination mechanisms.
- Systematize methodologies and experiences in environmental education and communication through the development of a database and its dissemination through REDESMA.
- Carry out research at the national level and studies to analyze the perception, knowledge, and behaviors of varied target audiences related to environmental issues, the application of regulations, and results of environmental conservation actions and processes.
- Design and produce EE&C materials through formative research and participatory methodologies that can be utilized by all partners.
- Establish cooperative links with State entities responsible for environmental management to provide input to the design of policies and implementation strategies, participate in project activities and exchange information and experiences.

7.7.2 Promote Information and Experience Sharing, and Dissemination Processes to Generate Environmental Awareness in the Population

- Organize an annual seminar of high technical quality to present experiences and relevant environmental studies and to analyze key environmental management topics, in order to facilitate information exchange, reflection and the development of political leadership in the scientific and environmental community, reporting out to the public at large.
- Strengthen the role of the media in developing national public opinion and issuing a call to action for environmental conservation through seminars and a postgraduate course directed at journalists interested in environmental issues. Establish mechanisms for monitoring long-term professional development. This program should be designed and implemented by CIDES, the Institute of Ecology of the San Andres University, and the Chamber of Communications Media.
- Carry out long-term information and dissemination campaigns on key environmental topics, such as fire prevention and protected area conservation, through radio, television and the print media in coordination with SERNAP, the Viceministry of the Environment and the *Superintendencia Forestal*.

7.7.3 Support School Level Environmental Education and Technical Training in Biodiversity Conservation and Forest Management

- Strengthen the Transformation Program of the Education Reform through the environmental cross cutting theme and development of diversified branches of life sciences in schools selected because of their links to protected areas of the SNAP.
- Train technicians and professional staff working in environmental education, communication, biodiversity conservation, community forestry and forestry technology through specialization and postgraduate courses in within the country and abroad.
- Produce educational materials and research reports for school libraries related to biodiversity conservation, ecological processes, and environmental literacy.

7.7.4 Develop Biodiversity Resource Management Capacities, with an Integral and Business Focus

- Establish a scholarship system to promote the formation of forest technicians in TCOs and municipalities.
- Include a training program for forest association promoters of integral forest management as a central component of planning and forestry operations.
- Develop training workshops on topics related to social control, benefit distribution, internal regulation establishment and environmental conflict management for forestry association members, local authorities and grassroots organization representatives.
- Lend technical assistance to communities and grass roots organizations in the definition of principles, criteria and indicators to evaluate quality of life, conservation and economic viability of ventures based on biodiversity use.

7.7.5 Strengthen Environmental Education and Communication Actions of SERNAP and the Viceministry of the Environment and Forestry Development

- Inform the population of biodiversity regulations, natural resource benefits, environmental control and natural resource management through mechanisms that facilitate communication, workshops and dissemination through public media channels.
- Strengthen the participation of local social actors linked with protected areas, through permanent communication activities with members of the management committee. Support the construction of collective action processes and training in legal regulations, protected area and environmental conflict management.
- Training and information for technical personnel and municipal government authorities, prioritizing those related to protected areas of the National System of Protected Areas and those who carry out forestry and biodiversity use activities. Topics for training include environmental planning, community involvement, natural and cultural history interpretation, communication strategies and methodology, protected area management, legal regulations, forestry operation procedures and others. The Institute of Ecology, SERNAP and the Viceministry of the Environment and Forestry Development should organize these training courses and workshops.

8.0 Priority Work Areas

This section presents, in the form of a Results Framework, the Team's recommendations to USAID/Bolivia for how to achieve its environmental Strategic Objective "Forest, Water and Biodiversity Resources Managed for Sustained Economic Growth." The four priority work areas are (1) sustainable tropical forest management; (2) forest products industry; (3) community forestry; and (4) protected areas and biodiversity.

8.1 Sustainable Tropical Forest Management

The ARD Team recommends that USAID/Bolivia assist Bolivia to conserve and manage the Permanent Production Forest of the northern lowlands to achieve the Intermediate Result "**Tropical Forests Managed in a Sustainable Manner**."

The Team recommends that USAID/Bolivia focus on achieving three subintermediate results:

- National policies support sustainable forest management;
- Key institutions support sustainable forest management;
- Silvicultural knowledge supports sustainable forest management.

8.1.1 National policies support sustainable forest management

The Team recommends that USAID/Bolivia assist Bolivia to achieve the result "**National policies support sustainable forest management**." If forests are to remain a widespread land use in the Bolivian lowlands, national policies cannot continue to favor their conversion to agriculture and pasture. National policies must effectively support forest management.

To achieve this result, the Team recommends that USAID/Bolivia finance: (1) detailed studies on the effects of national policies on forest management; (2) the preparation of draft legislation and regulations necessary to change national policies; and (3) communication to decision makers of the results of the studies and the content of the draft legislation and regulations.

USAID/Bolivia could provide technical support for these actions through US institutions that have experience in forest policy studies, such as US universities with forestry schools or research institutes, in coordination with Bolivian environmental and forestry public and private institutions.

8.1.2 Key institutions supporting sustainable forest management

The Team recommends that USAID/Bolivia assist Bolivia to achieve the result: "**Key institutions supporting sustainable forest management**." The *Superintendencia Forestal* requires financial assistance for its operating expenses while it seeks alternatives to the *patente forestal*. Those municipalities that establish forestry departments need technical assistance in order to adequately support the establishment of TCO and ASL forest management units within their jurisdiction. INRA requires financial and technical support in order to complete its task of resolving conflicting claims to forestland and forest resources.

To achieve this result, the Team recommends that USAID/Bolivia provide financial and technical support to the *Superintendencia Forestal*, selected municipalities and INRA.

USAID/Bolivia could provide financial support directly to the institutions and technical support by means of a technical assistance contract with a consulting firm.

8.1.3 Silvicultural knowledge supports sustainable forest management

The Team recommends that USAID/Bolivia assist Bolivia to achieve the result "**Silvicultural knowledge supports sustainable forest management**." Without an adequate understanding of the lowland forest silviculture their sustainable management is not possible. To achieve this result, the Team recommends that USAID/Bolivia, in the short term, continue its support to ongoing silvicultural research and in the longer term, assist Bolivia to establish a permanent forestry research institute.

USAID/Bolivia could continue to support silvicultural research by researchers in US universities while working with Bolivian government institutions, private universities and the forest product industry to establish and finance a permanent forestry research institute.

8.1.4 Cooperation with other Strategic Objective Teams

The Economic Opportunity SO supports tropical forest management by promoting the competitiveness of forest products. The Democracy SO supports participation in local government. This participation could include land use planning and forest management. The Health SO does not include any activities that are closely connected to forest management. It could, however, direct monies to improve health conditions at the local level in municipalities that are promoting forest management. The Alternative Development SO includes financing for agroforestry. The level of funding could be usefully increased to include forest management, land-use planning and buffer zone management adjacent to national protected areas. This would reduce the spread of coca production while helping conserve biodiversity in the protected areas.

Box 3. Tropical Forests Managed in a Sustainable Manner

Priority Area 1:
Tropical Forests Managed in a Sustainable Manner

Expected Results	Recommended Actions	Collaboration
National policies support sustainable forest management	• Study policies that will make the primary forestry industries competitive • Help change the Bolivian Forestry law and regulations to support primary forestry industries • Generate consensus for the support of the application of new policies and regulations	Government Ministries, Municipalities, NGOs, and Projects, SOEO
Key institutions support sustainable forest management	• Provide technical and financial support for forest units of municipalities for the establishment of ASLs and TCOs • Provide technical and financial support to the *Superintendencia Forestal* • Provide technical and financial support to INRA for improved forest concessions	SOD, NGOs, Municipalities, and community organizations
Silvicultural knowledge supports sustainable forest management	• Applied research on regeneration of lowland forest	US universities, NGOs, communities

Education and Communication

Educate and promote the application of new policies; disseminate results of applied research; train professionals and technicians in the sustainable management of tropical forests.

8.2 Forest Products Industry

In terms of private-sector investment, the forest products industry is globally viewed as a mature sector with moderate, long-term returns on investment. Though tropical wood has a higher per-unit value than most temperate woods, excessive waste and the lack of infrastructure override the advantageous labor and raw material costs. In today's risk-averse investment climate, the forest products sector must demonstrate a reasonably secure environment with the potential for growth and stability to justify the high risk of investment.

The forest products sector has low costs of entry, but significant investment in primary and secondary processing is needed to be competitive. In Bolivia, technological improvements in the forest products sector are relatively small or nonexistent with a history of little or no foreign investment. New sources of capital from venture capital, donor institutions or commercial lenders will not be accessible for the Bolivian forest sector unless barriers for investment are removed within and without the industry.

To improve the efficiency and profitability of the industry, investments need to be made at all points of the value chain. Training and education at the community forest level is as critical as services for established companies with international markets. To make investments more attractive, there are a variety of prerequisites discussed below.

8.2.1 Improved Trade and Marketing

Utilization and marketing of lesser-known species (LKS) on a commercial scale remains the most consistently persistent obstacle to forest product development and sustainable forest management of these diverse tropical forest ecosystems. A wealth of existing research on mechanical properties and woodworking characteristics of lesser-known species is available and needs to be synthesized for the Bolivian situation. Because of the region-wide distribution of these species, international alliances for collaborative research and development between Bolivia and other South American countries, particularly Brazil, are essential. Standardization of nomenclature, quality and market characteristics of lesser-known species are only part of the challenge of developing market recognition and penetration of Bolivian forest products into international trade and value-added sectors.

Third party certification is the current vehicle for entry into lucrative niche markets and increased market share. Branding all Bolivian forest products for export with the certified logo is the best strategy to associate Bolivian wood with high environmental standards. Collaborative research and development on specific bottlenecks in the chain of production should be channeled through the *Fundación de Trópico* and carried out by the most appropriate national or international institution. For example, the current ban on log exports in Bolivia should be re-examined to determine the incentives for private and industrial landowners to reinvest in sustainable forest management.

The 1998 Mater Engineering study on market research on lesser-known species gives a thorough analysis of market trends and a stepwise 11-point program for introducing value-added Bolivian products into the North American market.

1. Target your audience and tell your story.
2. Initiate mechanical testing of targeted wood species to the American Society of Testing and Material Standard (ASTM) D2555-70.
3. Develop good "sound bites" for technical information.
4. Create specialty species names.
5. Create custom or specialty grades.
6. Evaluate in-field anti-staining applications targeted to certain species.

7. Rely on a "product" model versus a "lumber" model to sell the species (including a Materials Production and Finishing Center).
8. Pay attention to the value ($) of good "business basics."
9. Target certified markets in the US and Europe.
10. Target special products within major markets.
11. Establish direct communications with targeted buyers.

In addition to the specific market strategy for introducing LKS, the 1998 Matter Engineering report proposes an 11-point action plan to implement an overall long-term marketing strategy for the Bolivian forest products industry (see *Markets Research Project for Four Lesser-known Bolivian Hardwood Species;* pp. 72-78). Many of these action items are being successfully implemented or in the planning stages. Others are incompatible with shifting economic realities in the global marketplace and need to be updated. Others will require investment and further development of the forest products sector. Regardless, the proposed Mater Engineering document presents a working, long-term marketing strategy that needs to be revisited and revised as part of the USAID five-year strategic plan for the sustainable forestry and forest products.

Design challenges, shop-testing programs and a materials testing, production and finishing center are other ideas that should be incorporated into a forest products sector strategy. Forward integration—selling directly from the forest to the end user—and greenwood technologies are appropriate marketing strategies for community enterprises. CADEFOR has been in discussion with World Bank about creating a revolving loan fund for community forestry investments.

Participation in public relations events, product fairs and national and international trade associations is already in place with. CADEX, CADEFOR and the Forestry Chamber of Bolivia jointly working together to promote the industry. CADEFOR has taken a lead role in working with groups like BOLINVEST, a private organization that promotes investment in the Bolivian forest products sector; SEAF (an NGO) and CEPROBOL, a Bolivian government organization to promote national and international investment and to secure small and medium-sized loans for businesses in the forest products sector. SBPC is a Bolivian government organization that has been recently formed to support the development and competitiveness of various sectors of the Bolivian economy including forest products. Cultivating media contacts in trade journals and the business will elevate the exposure of Bolivian forest products, and promotional materials are currently being developed for the industry and individual businesses.

8.2.2 Research and Development on Appropriate Technologies

Capturing the existing installed capacity with improvements in key sectors like kiln drying, handling and waste recovery in harvesting and production is the first step to improving yield. Companies need to initiate capital investments to replace outdated machinery and efficient technologies. Upgrading equipment to current manufacturing standards with limited resources requires a balance of investment strategies and appropriate technologies that should be integrated into this larger vision. According to the 1998 Mater Engineering report, serious consideration should be given to providing less final greenwood cutting in the field and pre-drying capabilities at remote facilities.

For smaller producers, a flexible-manufacturing network (flexnet or woodnet) is a feasible option. Bringing together small manufacturers and producers to work collectively on larger orders or projects is the basis of a flexnet. These can be formal or informal associations that expand and contract on a temporary, fixed-period or permanent basis to work together to reduce costs on a local or regional basis. Shared resources, equipment and information allow outsourcing to kiln facilities or other processing machinery on an as-needed or contract basis as an alternative to large-scale investments. Flexnets allow smaller manufacturers to compete on larger valued-added projects or help fill orders for primary or secondary materials. In the United States and Canada, these associations have been shown to provide a forum to share expertise, offer training, promotion and build

solidarity among members. The original European models for a flexible manufacturing network were more focused on increased production and capitalizing on economies of scale.

USAID can facilitate the formation of these woodnets by working with NGOs, industry trade associations and woodworkers. USAID could bring in experts familiar with the operation of networking strategies and support the formation of prototype networks on an industrial or smaller woodworking scale in Santa Cruz, Cochabamba and La Paz. USAID can evaluate the effectiveness of these woodnets in the context of the emerging forest products sector and provide support for the appropriate Bolivian model. The idea of *centros de acopio* or "concentration yards" or "remanufacturing centers" is another option. A centralized processing center that houses newer sawing technologies (i.e., a circular saw for high density hardwood and quarter sawing for vertical grain), a filing & grinding center, concentration yard for logs or lumber and a technical training center is being discussed by FUNDA-PRO as an alternative strategy that takes advantage of economies of scale in centralized processing. USAID should collaborate on the design of this manufacturing center and should assist in an evaluation of existing initiatives or working models in other countries before investing in development of the Bolivian model. USAID could work with USDA Forest Service, industry and other international institutions to provide technical expertise for the center.

8.2.3 Development of Entrepreneurial Skills and Better Business Practices

In additional to capital investments, investments in administrative, human resources, and operational investments are necessary. Without changes in accounting and control practices, financing is likely to remain illusive. Transparent and auditable bookkeeping following accepted international standards is required to improve credit ratings and access to capital. Improved training and inventory programs designed for the forest products sector will reduce stock and cash flow and facilitate just-in-time (JIT) manufacturing and delivery. With a four to six week time lag, JIT will need to be modified to reflect the transportation challenges facing the Bolivian forest products industry

Business forums and workshops will help demonstrate acceptable norms and tolerance for the international market. Rapid turn-around on inquiries and follow-up is critical for customer service and development of a client base. Although price, product value and JIT delivery are paramount, in the long term, successful companies credit the cultivation of personal contact and client support as the distinguishing characteristic that allows them to compete successfully and set them apart in the marketplace. Development of sales departments, sales representatives or sales offices overseas will expand as demand is created in the marketplace.

Strategic alliances in developing the forest product sector and improving the entrepreneurial leadership will require a variety of programs and collaborative management. Partnerships between existing organizations could provide the framework for marketing, extension, research and training on managerial skills and more efficient production in the forest sector. Currently, all USAID SOs are contributing in some way and could increase collaboration to promote protection of biodiversity, sustainable forestry and forest products development. The SO1: Democracy is working to promote participatory democracy and fight corruption, which could help the forest product sector in terms of giving all Bolivians rights to appropriate forest resources as well as changing legislation and promoting trade and business. SO2: Economic Opportunities is working with the Environment SO to promote trade and enterprise development at the micro and macroeconomic level. SO2 works with industry and communities to improve business practices as well as help find financing and support for capital investments for export and trade. SO3: Health can aid with worker safety and health in manufacturing and harvest providing health services and potable water in remote conditions. SO4: Environment has been supporting certification, BOLFOR, CADEFOR and institution building and research in protected areas, as well as biodiversity and sustainable forest management. SO5: Alternative Development is supporting on-farm woodlot management and can play an increasing role supporting agroforestry with research and development on utilization and marketing of fast-growing, leguminous species and cash cropping of wood for charcoal, construction materials and value-added products.

Box 4. Improved Community and Private Forest Industries

Priority Area 2:
Improved Community and Private Forest Industries

Expected Results	Recommended Actions	Collaboration
Improved Trade and Marketing	• Research on the utilization and marketing of LKS • Monitor market trends • Utilize lower quality and smaller diameter wood • Develop and design new products • Development of materials and finishing center, shop-testing and development of prototypes. • Analyze log exports	CADEFOR, Camara Forestal, BOLFOR, SIF, CFV, Univ. Privada SC, PRODUCCION PRO, FUNDA PRO, Internacional Networks, SOE, SOEO, SOAD
Research and Development of Appropriate Technologies	• Optimize existing installed capacity • Maximize efficiency • Research the use of residual wood products • Research wood drying • Better utilization of labor and reduction of handling • Development of flexible manufacturing networks (flexnet or woodnet)	CADEFOR, BOLFOR, Fundación Pando, SIF, CFV, PRODUCCION PRO, FUNDA PRO, redes internacionales SOE, SOEO, SOAD
Development of Entrepreneurial Skills and Better Business Practices	• Conduct cost benefit analysis. • Establish better inventory controls • Develop a public relations and marketing strategy • Examine Just-in-time (JIT) delivery and manufacturing • Improve transparent and auditable accounting • Improve global communication • Utilize appropriate technology • Develop of sales and market departments • Create funding opportunities through investment and financing	CADEFOR, CADEX, CFV, banks and financial institutions, PRODUCCION PRO, FUNDA PRO, international networks, SOEO, SOAD

Education and Communication
Research, training and promotion of efficient industrial procedures, marketing investment, commercialization of lesser known species and development of entrepreneurial skills.

8.3 Protected Areas and Sustainable Management of Biodiversity

To advance the protection of biodiversity in Bolivia, the Team recommends three expected results: long-term financing, strengthened institutions and a revised legal framework. See Box 5.

Box 5. Improved Management of Protected Areas and Biodiversity Conservation

Priority Area 3:
Improved Management of Protected Areas and Biodiversity Conservation

Expected Results	Recommended Actions	Collaboration
Long term financing and institutional capacity for management of protected areas strengthened	• Negotiate long term funding with donors and government. • Raise local funds • Support a new Master Plan • Support training of technical personnel • Clear up land titles • Improve legislation	SOE, SOEO, SERNAP municipalities, users of forest resources, community groups
Local Organizations support management of PAs	• Support local management committees • Create private sector concessions • Improve infrastructure of PAs • Develop regional management offices • Train local institutions in sustainable management • Promote ecotourism • Buffer zone management	NGOs, universities, private sector, municipalities, *mancomunidades*, SOE, SOD, community groups
Legal and institutional framework for biodiversity use and conservation strengthened	• Increase local participation in management. • Protected Area Law • Promote and regulate wildlife exports, sport hunting and fishing • Promote and regulate the use of other non-timber forest products • Conduct research on management on wildlife and non wood products	DGB, CITES,, Superintendencia Forestal, Universities, NGOs, SOEO, SOE

Education and Communication
Train technicians, promote communication between the PAs and communities, and teach about the mega-biodiversity.

8.3.1 Long-Term Financing and Institutional Capacity

Negotiations should continue to generate donations from international agencies concerned with biodiversity conservation, while other funding activities are initiated including charging entrance fees and user fees, and pricing environmental services offered by parks, such as recreation and water. Infrastructure, visitor services and security should be improved in parks to justify both fees and international investment. Management plans, including communication strategies, should be updated or completed. Park workforce should also be trained and adequately paid. In particular, training is needed in participatory planning, buffer zone management, conflict resolution, interpretive services and community interaction, and education. Resolution of land tenure problems is necessary to protect the stability of park and protect area boundaries. Laws are in place for park protection and operation, but are difficult to enforce. Improved participation of park inhabitances in the management of the protected area is one way of dealing with land tenure problems.

8.3.2 Local Organizations Support Protected Area Management

Benefits to communities should be determined and communicated to motivate community participation. Local organizations could benefit from the development of sustainable tourism opportunities and training of park personnel. Private sector concessions through permits could generate both local enterprise and operating funds

for protected areas. Development of educational materials and products for sale to visitors can also generate operating capital. Community education programs brought by park staff to schools and other gatherings would develop good public relations and increased awareness and support. Sport hunting, limited logging, harvest of non-timber forestry products, and water rights are all environmental services that could be analyzed as options outside the protected areas analyzed as options (outside of protected areas) to generate income for the conservation of biodiversity.

8.3.3 Legal and Institutional Framework Strengthened

Protected areas not under the administration of SERNAP could be organized into regional divisions managed by municipal associations or *prefecturas*. Regional offices could coordinate with local organizations to improve administration and minimize costs. Increased representation of ecological zones within protected areas would be another benefit of decentralized, regional protection programs. Coordinating committees already in place in some areas should receive technical assistance in policy, planning, administration and others from SERNAP. SERNAP could sell these services to support its budgetary needs. On the other hand, the government is responsible for the efficient operation of SERNAP. If it fails to meet this responsibility, protected areas will suffer, and SERNAP will falter. Passage of the Protected Areas Law should be a high priority which could use donor and specifically USAID support.

Wildlife is a very important component of biodiversity conservation in protected and non-protected areas. Although many laws exist, uncontrolled hunting and illegal trade of wildlife persists in Bolivia. Promoting the management of wildlife would help control this situation. Wildlife management would also produce income and employment through hunting fees, sustainable tourism (bird watching and wildlife viewing), and legal export of economically important species and their products. Sport fishing is also an important area to consider, particularly related to tropical rivers that have many species challenging to and desired by anglers. But for this to happen, new laws may be needed. For example, wildlife is not considered in the implementation of forestry development plans, albeit communities depend on wildlife. Inclusion of wildlife in both forestry and protected area management plans would certainly increase the income generated by these plans.

NTFPs are abundant and could also be managed for profit. Medicinal herbs and fibers seem to be in demand. Local markets report sales of these and other products such as wild fruits and nuts. On the other hand, little is known of these products, and like wildlife, they cannot be managed without improved knowledge. Projects should collaborate with universities and private individuals to complete needed research. Research subject areas include species identification, abundance and population density, reproductive habits, habitat, and management techniques.

USAID/Bolivia's draft Concept Papers include goals and suggest activities that could support biodiversity conservation. However, SO democracy, health, economic opportunity, and alternative development are not currently directed toward the conservation of biodiversity. Simply by considering the traditional use of wildlife and plant species in new activities these programs could support the conservation and sustainable management of important biological species.

Finally, there is a lack of knowledge and professionals dedicated to biodiversity management in Bolivia. Collaborative efforts should assist in training a new cadre of professionals to promote the utilization of selected wildlife and plant species of social and economic value.

8.4 Community Forestry

Community forestry seeks to improve the livelihood of rural communities through sustainable management of natural resources. The Team recommends that USAID/Bolivia strongly support the development of community forestry development programs in Bolivia. This can be done by generating the following expected results.

8.4.1 Local Development Agencies Execute Participatory Extension Programs

Participatory extension programs are needed to prepare communities for self-reliant development. These programs may be conducted by community organizations, NGOs, municipalities and other local development agencies. To be effective, however, these must be efficient in a number of critical areas: policy development, participatory analysis and planning, conflict management, the elaboration, negotiation and execution of community forestry projects, and the design and implementation of improved agriculture production and forest development systems.

In general, most community forestry projects financed by USAID conduct their own extension activities. However, projects are finite. This means that the extension programs they conduct are not sustainable over time. To avoid this problem, projects should focus on strengthening the capacities of local development institutions to work with rural communities. In this way, rural communities will not suffer when donor projects terminate.

8.4.2 Communities Sustainably Manage Natural Resources

Communities need strengthened capacity for forestry development activities. Although situations will differ greatly from community to community, extension programs will have to work with a number of important issues: land tenure, design, execution, and evaluation of integrated management plans, negotiations and conflict management, and farmer-to-farmer training programs. Those communities managing forests would also have to learn business skills, including promotion and commercialization of the products they produce.

As was noted previously, strong leadership and community organization is needed to successfully execute community forestry development plans. Here it is essential to allow the community to chose its leaders and work to strengthen the organizational structure that exists rather than create something new and strange to the community. Respecting these traditional values will help gain the confidence of the community and thereby facilitate the development process, in general. Another way a facilitating the development process is to allow farmers to lead development efforts once they have proven themselves, thus farmer to farmer training programs are advised.

8.4.3 Participatory Methodologies and Productive Technologies Improved

By improving the participatory methodologies and productive technologies currently used in extension programs, communities could be better served. For example, forest management plans could be formulated in a more equitable manner, taking into account the important and productive role of women in development. Also, new technologies could be developed that provide more direct benefits to women and their immediate families. Family gardens, wildlife management, and the use and marketing of non-timber forest products are some of the options open in this field.

Another important concept to consider here is the monitoring and evaluation of community development activities. By monitoring their activities, communities learn from their mistakes and, if properly trained, take steps to correct these errors before disaster strikes. To be effective, these monitoring activities should based on development indicators designed and continuously improved by the communities members themselves, in collaboration with their development partners.

8.4.4 Education and Communication

The execution of education and communication activities would increase potential for success. For example, high level understanding of the benefits inherent in community forestry programs would increase the political and financial support given to these programs. However, before developing additional community forestry

projects time should be taken to analyze the results and lessons learned in this field. FAO, COSUDE, CARE, WCS, and WWS all have experience in implementing community forestry activities. Therefore, it is recommended that USAID join with these organizations to conduct this exercise.

8.4.5 Collaboration

Collaborative programs with internal offices are also advised. The needs, desires and capabilities of the stakeholders dictate the nature of a collaborative community forestry program. For example, indigenous and other rural communities lack healthcare services; NGOs, municipalities, and indigenous organizations lack skills in participatory development and conflict resolution; and universities and other research organizations generally do not generally know how to work with farmers.

All SOs could contribute to the design and implementation of community forestry programs. Areas of collaboration include the following: SO1: Democracy—participatory methodologies; SO2: Economic Opportunities—trade and markets; SO3: Health—community health programs; SO4: Environment; SO5: Alternative Development--productive systems and financing; and PL-480: Food Security—clean drinking water and integrated farm management. More specific collaborative activities with SOs and their partner organizations are presented in Section 9.

Activities proposed in the draft Concept Papers that could negatively affect community forestry projects are discussed under Environmental Impacts below. Two activities on this list are significant: top-down development programs and coca eradication. Here is some food for thought. When farmers are not allowed to plan their future according to their own perceived needs, their determination to succeed in development is lost.

Recommendations related to the community forestry projects visited are given in Section 6 and therefore only briefly summarized here. Ample justification exists for continuing forestry and agroforestry activities in the Chapare. Important elements to consider in the future include consolidation of farm and forest management areas and networking aimed at assisting local development agencies in continuing forestry extension programs once the project has terminated.

Box 6 summarizes this priority area, expected results, recommended actions, and opportunities for collaboration discussed above.

8.5 Environmental Education and Communication

The greatest efforts carried out so far in relation to forest management have been directed to the application of the new forestry regime, promoting the use of timber by forestry concessions, ASLs and social associations in TCOs. This has lead to the undervaluation of NTFPs, with the exception of carbon sinks and Brazil nuts, and to a lack of action to promote NTFP use. The Team believes that efforts should be made to identify and develop other innovative environmental services, including watershed management, carbon sequestration, tourism and NTFPs like wildlife, medicinal herbs and food products. This focus will contribute to ecological and economic sustainability and to a broadening of economic opportunities for communities and user groups. This requires a strong impulse for basic and applied research. It also implies the formation of a cadre of specialized professionals in wildlife management, community forestry development, agrobiodiversity, ecotourism, biotechnology and other technical fields of interest. This requires training in forest development and environmental technology for the staff of municipalities. Finally, the development of systematic and coordinated actions of environmental education and communication will support all of the above priority areas.

Box 6. Improved livelihoods of rural communities through sustainable management of natural resources

Priority Area 4:
Improved Livelihoods of rural communities through sustainable management of natural resources

Expected Results	Recommended Actions	Collaboration
NGOs, public institutions and indigenous organizations execute participatory forestry extension programs	• Introduce new policies/incentives • Analysis and implement lessons • Elaborate and negotiate projects • Conduct participatory planning • Train and educate	Superintendencia Forestal, NGOs, Municipalities, SOD, FAO
Communities manage natural resources for social, economic and environmental benefits	Strengthen community to: • Clean up land tenure • Elaborate and negotiate integrated plans • Execute and evaluate plans • Farmer to farmer training • Leader formation	CONSUDE, WCS, WWF, SOAD, SOH
Participatory methodologies and productive technologies improved.	• Design and validate • Organization/Planning • Monitoring and Evaluation participation • Food security • Income generation	Universities, NGOs, FAO,SOD

Education and Communication
Promotion of participatory development; formation in participation, wildlife management, NTFPs, ecotourism, agroforestry, community enterprises and food security; awareness campaigns to prevent deforestation, wildfires and destruction of biodiversity.

Forests are very important for Bolivia in terms of extension, biodiversity, and the varied environmental benefits they provide communities and regions of the country and because of their recognized economic potential. The populace neither understands nor actively supports activities necessary for sustainable forest management and biodiversity conservation. Therefore, it is important that USAID/Bolivia contribute in a decisive way to intensive education and communication campaigns through training, participatory activities, education curricula, and mass media to convey the value and benefits of sustainable forest management, wildlife and protected areas, and control and prevention of forest fires. Last year forest fires alone caused the loss of approximately 12 million hectares.

The majority of rural communities, especially indigenous groups of the Amazon and the Chaco, traditionally use forest resources to obtain animal protein, food, medicines, handicraft materials and firewood, and many of them sell wood in local markets. Hence, it is a priority to promote community and TCO development based on natural resource management. USAID-Bolivia could contribute in the following way:

- Establish a scholarship program for indigenous and campesino technicians and promoters.
- Carry out participatory investigations to recover cultural practice and knowledge and generate new knowledge.
- Support local management of natural resources in TCOs and communities linked to protected areas.

- Carry out workshops for the analysis of key topics that permit the construction of cultural concepts for biodiversity management, the definition of social control mechanisms and the development of instruments for conflict management.

Because of the central importance for municipal governments in local development and applying state policies, it is necessary to strengthen their management capacity and interaction with their local social actors. USAID/Bolivia has the potential to significantly contribute to the development of environmental planning, technical capacity, capacity for the design of sustainable development strategies and for the implementation of natural resource use projects with economic and conservation potential.

It is strategic and essential for the environmental and academic communities to promote conservation and awareness of its importance for national development. One of the most important activities in this sense is the development and implementation of a coordinated environmental education and communication strategy, and development of materials which could be lead by a national NGO, academic institution, or other qualified organization. This strategy will ensure that the varied actions are coherent, are carried out on the basis of joint institutional efforts and have the desired impact in reinforcing and introducing conservation values and practices in the Bolivian society.

9.0 Internal and External Collaboration

Increasing collaboration in three areas will greatly enhance the effectiveness of USAID: community participation, host country agencies and institutions, and an internal inter-disciplinary approach.

9.1 Community Participation

Programs and activities designed around real, rather than perceived or assumed, needs, desires, and abilities have a much greater likelihood of success. Designing and implementing *with* rather than *for* develops ownership, decreases conflict, builds capacity and ensures long-term sustainability. Communities—the people on the ground that need the programs—should be included in policy decisions, developing area plans, designing technological research and technology transfer programs, and in applying the new methodology. Their voices must be heard and understood. Solutions must be negotiated. Training through guided practice in applying solutions will develop not only the capacity to address the issue immediately at hand, but the capacity to apply newly learned techniques and approaches to the next issue that arises. Community participation is a partnership between communities and government, stakeholders, and donors.

9.2 Host Country Agencies and Institutions

Like community participation, working with and through local agencies and institutions is another method of developing ownership, decreasing conflict, building capacity and ensuring long-term sustainability of programs. When governments are involved in projects, policymakers understand the need for and the context of policies, and are more likely to support programs. Local organizations, generally having credibility and trust amongst their countrymen, can be much more effective than a foreign entity or even government officials in implementing programs and interacting with communities. Strengthening the capacity of local institutions through guided practice increases their administrative capabilities, builds technological expertise, and develops a planning approach that can be carried from project to project. Working with organizations without regard for political association develops capabilities that carry forward no matter how the government of the country changes. Most change takes time, and many donors are not involved long enough for societal changes to take hold. Local organizations will be the ones to carry programs forward for widespread adoption.

Local organizations can also be effective networkers, helping all parties involved develop common objectives, establish group direction and share information both vertically and horizontally.

9.3 Internal Approach

This report has identified four priority areas, including expected results and recommended actions, under USAID's SO4: Forest, Water and Biodiversity Resources Managed for Sustained Economic Growth. Collaboration between all SO Teams and partner institutions is essential for success in each of these priority areas. Participation in addressing SO4 can assist each SO Team in achieving the results identified in their draft Concept Papers. Within USAID/Bolivia, an interdisciplinary approach to an overarching theme, pooled resources, and SO teams working together toward common goals will create a synergy that is greater than the sum of its parts, with magnified potential for success across a broad spectrum.

9.4 Environmental Education and Communication

Environmental education and communication is a crosscutting and essential component for the completion of all priority programs to promote sustainable forest management and conservation of biodiversity. The overall link between USAID/Bolivia's strategic objective teams and partners is the relationship between Bolivians' natural resource management and the resulting impact on their income and health. The challenge is to empower

Bolivians to match land-use to land capability in a way that creates tangible, positive and sustainable democratic, economic, social, and health benefits (GreenCOM, 2001).

All of USAID/Bolivia's SO Teams are involved in communication for technology transfer. A systematized approach to technology transfer would reduce duplication. A system of toolboxes, developed through a participatory process and through formative research, would allow each SO Team to develop a communication toolbox that could be reproduced and implemented by other SO Team partners and projects (GreenCOM, 2001). Collaborative training would develop skills and strengthen networking and cooperation between projects, reducing duplication and cost. A standardized core of communication messages also broadens the impact.

These toolboxes and communication techniques could be applied by all SO Teams and partners to increase interaction, develop constituency and advocacy for policy, strengthen municipal capacity, increase community participation for local action, utilize mass communication to increase awareness, issue a call to action, and report on progress. An outline of specific tactics that could be applied by each SO Team can be found in the 2001 GreenCOM report on using education and communication to achieve Strategic Objectives and Intermediate Results.

To develop environmental and communication activities, and to strengthen social participation and training, it is also important for USAID-Bolivia to establish alliances with leading institutions and strategic importance, such as:

- National Service of Protected Areas (SERNAP) in the implementation of educational and communication activities in municipalities, communities and schools linked to protected areas.
- Viceministry of the Environment and Forest Development in the inclusion of environmental education actions and training programs directed at user groups, communities and municipalities, in their forest management and biodiversity conservation programs.
- Internal alliances to coordinate and contribute to the actions of all USAID/Bolivia SO Teams.

9.5 Collaborative Program Recommendations

Recommendations for collaborative programs addressing the four Priority Areas are outlined in Appendix E. Many of the activities shown in the appendix are considered in the USAID general concept paper.

Appendices

Appendix A: Biodata

Charles B. Jordan (Team Leader), An important architect of community development programs, Mr. Charles Jordan's book traces the history and presents lessons learned in community forestry development programs in Andean countries over the last 20 years. He has worked in Africa, Asia and Latin America assisting governments, local development institutions and non governmental organizations (NGOs) in capacity building for the implementation of decentralized programs and projects dealing with rural development and the sustainable management of natural resources in tropical and sub tropical regions.

Bruce S. Kernan, President of Sustainable Development Services, Quito, Ecuador has a Master of Forest Science from Yale University. He has lived and worked in South America since 1983 when he was assigned to Ecuador as a USAID Foreign Service Officer. He was the USAID Regional Environmental Advisor for South America from 1984 to 1998. Since then has been an independent consultant in forestry and environmental assessment for USAID and a variety of other development organizations.

Yurij M. Bihun, Director, Shelterwood Systems in Burlington, Vermont is a forester and a forest resource analyst with more than 25 years of experience in forestry and natural resource management in North America, Latin America and Eastern Europe. Mr. Bihun has advanced degrees in forest management and forest genetics from Oregon State University and the University of Maine. He has worked in the public, private and non-profit sector on variety of industrial forestry, agroforestry, community forestry, extension, and forest stewardship issues. His specialization includes utilization and marketing of lesser-known species, sustainable forest product development, certification, silviculture and conservation site planning. Mr. Bihun is a freelance correspondent and contributing editor to variety of forestry and industry trade publications in the United States and United Kingdom.

Michael Dockry is currently employed by the USDA Forest Service as the assistant forest planner for the Green Mountain National Forest and Finger Lakes National Forest and is stationed in Hector, NY. He is working on the revision of both forest management plans and has been utilizing innovative community involvement strategies. He has a BS degree in Forestry and Environmental Studies from the University of Wisconsin-Madison. He also has a MS in Forest Resources from Penn State University. Mike worked as an Environmental Planner for the Oneida Tribe of Indians of Wisconsin for a short time before entering the Peace Corps as a volunteer in Bolivia. He worked in Bolivia for three years and spent the first two years in a small Andean community in the department of Cochabamba working on soil conservation, reforestation, agroforestry and environmental education. The final year of his service was spent working in Santa Cruz with community development, ecotourism and natural resource planning in the Bolivian National Park Amboró.

Roberta Hilbruner is the environmental education communication specialist for USAID/DC. She manages their global strategic environmental communication Project, GreenCOM, and provides technical assistance to missions both personally and through GreenCOM and the CLARA water education, monitoring and action project. She also provides assistance for protected area interpretation, education and sustainable tourism. Roberta has Masters Degree in Public Information and Education and worked for the USDA Forest Service before coming to USAID in 1999. She has 26 years of experience in environmental communications in 26 countries.

Dr. David Hughell has a doctorate in forestry with over 20 years of experience in geographic information systems (GIS), forest management, biodiversity conservation, and the development of computerized information systems. At ARD, he is responsible for management and operation of the firm's spatial data analysis facility and for providing short-term technical assistance to clients worldwide—most recently in Mexico, Nepal and Colombia. Prior to joining ARD, he was head of the GIS Unit at the Iwokrama International Center in Guyana, providing mapping support in the areas of forest management, village resource use, ecotourism, infrastructure development, and biodiversity prospecting. He was a consultant on Bolivia's *BOLFOR project* in 1994 and 1997, where he prepared guidelines for their environmental

monitoring and evaluation system, and assisted with the design for forest inventories. He has also assisted several private companies in adopting GIS technologies (Pulzar Desarrollo Forestal in Mexico and Smurfit Carton de Venezuela). Dr. Hughell is fluent in Spanish and English.

Damian I. Rumiz is an Argentine biologist established in Bolivia since 1993, specialized in ecology and conservation of tropical wildlife. He graduated as Licenciado in Ecology at the National University of La Plata and obtained a Doctorate in Natural Sciences at the same university studying the ecology of black howler monkeys. Received a Ph.D. in Wildlife Ecology at the University of Florida and worked as tropical biologist and field instructor in several conservation projects in Venezuela, Bolivia, Ecuador and Argentina. In Bolivia participated in biological inventories and student training activities as an employee of Wildlife Conservation Society and as the wildlife specialist of the BOLFOR project. Currently manages research and training projects at the Museo de Historia Natural Noel Kempff Mercado as a scientific advisor funded by WCS.

Elvira Salinas is a specialist in environmental planning, project management, indigenous participation and environmental education. Currently, she works with WCS-Bolivia on projects to train and strengthen an indigenous group, Tacana, for better management of their territory. She is also working on the management of environmental conflicts in the northern ecosystems of La Paz.

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Appendix C: List of Contacts

Interviews with Key People in Order of Interviews

Name	Contact	Salient Points
Victor Bullen Regional Environmental Advisor USAID	Calle 9 # 104 Obrajes; 278-5546 emial: bullen@usaid.gov	Terms of Reference; contact list, travel, environmental issues,
Barbara Beldling Director, Office of Environment, USAID	Calle 9 # 104 Obrajes; 278-5548; email bbelding@usaid.gov	Terms of Reference: Education and Communication important contacts such as Peace Corps, Ministerio de Desarrollo Sostenible, Alternative Development, SOT, USAID, etc
Ricardo Roca Steverlynck Advisor in Environment USAID	Calle 9 # 104 Obrajes; 278-5548; email rroca@usaid.gov	Forest Legislation, National Forestry Plan, the need to improve markets for wood and non wood forestry projects.
Janette Trujillo Cortez Gender Specialist Emajada del Reino de Los Paises Bajos	Av. 6 de Agosto # 2455, Edifico Hilda, Piso 7, 2-44-40-40	Joint meeting with USAID and the Embassy. Carrasco National Park is being invaded. What can be done to save it?
Ovidio Roca Avila Viceministro Ministerio de Desarrollo Sostenible y Planificación	Av. Mcal. Santa Cruz # 1092 Tel: 2-330762 email: vdsma@coord.rds.org Cell:71554355	The need to support forest industries; need to study and simulate markets for wood, can not understand why donors always want to help poor and do not talk of industry.
Jan Schollaert Director CARE	Pasaje Jáurequi 2246 (Sopocachi), La Paz, jschollaert@carebolivia.org	
Luis Ampuero Ramos Asesor en Politicas Proyecto Concade	Av. H. Ormachea N315, Obrajes Tel: 2786061	Always at odds with coca mafia; 10 years more to introduce crops: pineapple, bananas, pepper, palm hearts, etc. Reduced coca from 40 to 7,000 hectares. But coca invading parks.
Ing. Luis Castello Consultant	luiscaste2002@yahoo.com.ar	national forestry plan, stimulate the markets for wood, sell more species
Peter Bischop Head Latin America Division Swiss Agency for Development and Cooperation (CLOSUDE)	Freiburgstrasee 130.CH. 3003 Berne Tel. ==41-31-322-34-20 Email: peter.bischol@deza.admin.ch	COSUDE still works mainly in the Andean Highlands, but now is concentrating on small industries and empowerment
Lic. Jaime Ponce Blanco Director, Departamental de Recursos Naturales y Medio Ambiente Prefectura Cochabamba	Av. Aroma # 345 Cochabamba 591-4-4258077	Low budget, conflict management, good collaboration with project, but is upset that his office has financed project activities.
Dra. Ana Maria Fernández C. Jefe Superintendencia Forestal, Cochabamba	Colombia 340 Tel: 591-4-4523832 Email: sfcochabamba@hotmial.com	Good collaboration with C-23 (Jatun Sach'a); conflict management), replant instead of fines
Greg Minnick Manejo, Chief (10 years) Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-	Av. America E-155-Casilla 256 Tel: 28º801, 248124	Study history, Forestry Law set stage to work with people; this is alternative development, coca irradiation; seeking sustainability with Associations, private sector and Fundación Centro Técnico Forestal (CETEFOR) lot of control

Name	Contact	Salient Points
Ing. Javier Sanchez Forest Technician Jatun Sach'a	Av. America E-155-Casilla 256 Tel: 28º801, 248124; jsanchez@bo.net	Jatun Sach'a's Team, Short term income: management of natural forests; medium: agroforestry systems; and long term: plantations, real problem with DAI, no coordination, Ministry of Alternative Development should intercede.
Ivan Dávalos New Director del CETEFOR y ex Director del Parque de Carrasco Fundación Centro Técnico Forestal, Trópico de Chapare	Av. America E-155-Casilla 256 04-134310, 4-45-0511, email:divancho@hotmail.com	Goal: implementation Forestry Development Plan; need to come to terms with many people and organizations; Carrasco might be lost, 11 different invasion, only solution is redefine park
Don Antonio Arce Administrador	Asociación Integral Pall Wasi (AIPAWA	Very impressive. Logging operation with small saw mill, nothing in the bank but has an outstanding debts of US $ 6,000, good organization, strict controls, good organization and training.
Don Aurelio Fernandez Tractorista	Asociación Integral Pall Wasi (AIPAWA	On the job for 16 years; has seen how farmers have changed, many requests for assistance in forest management activities, rewarding feeling.
Don Vicente Agricultor		Very impressive agroforesty system; was offered $50,000 for the trees but has decided not to sell at this time; worried about river and Municipality.
La Selva Camu-Camu Administrador de la finca		Planting system: seeds, 6x6, pruning 3rd year, processed in Cochabamba, company buying from farmers
Ing. Anco Jatun Sach'a	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	1)need study impacts 2) need to design exit strategy 3) carbon potential; plantations plus land use changed 4) Integrated farm management- reduces pressure on forests. 5) Superintendencia will never be strong
Freddy Juchasara Tecnico Forestal Jatun Sach'a	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	Save park by managing buffer zones, Yes, it is possible to work with municipalities, other institutions to work with include CETEFOR the associations; need support of SERNAP, why not work with INRA.
Don Tibursio Amani, Agricultor Tranversal	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	Very impressive Finca integral: achoite, palmito, citricos, pastures, etc.
Don Andres Hidalgo Agricultor San Luacas	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	Forest Plantation. Impressive growth: *Centrolobium Tometosum* (tejeyeque)
Don Modesto Bautista Agricultor Dieciséis de Julio	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	Management of second growth forests

Name	Contact	Salient Points
Don Mario Bustamante Jefe de la Asociación de Ganaderos	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	Pasture improvement and tress. *Shysolobium Paraiba* (Serebó) ; Mario strongly supports this activity and the project but project no longer works in this areas due to differences with DAI.
Greg Minnik (second meeting)	Manejo, Conservación y Utilización de Recursos Forestales en el Tropico de Cochabamba-Fase II UNDCP-VIMDESALT-FAO (Jatun Sach'a)	Visions of institutionalization: 4,000 families, associations (160), private enterprise helping associations sell products, CETEFOR o0verseeing forestry development, good coordination between all participants.
Ken Wiegand, Director and Margaret Harrit, Deputy director, Alternative Development Office, USAID	Calle 9 # 104 Obrajes; 278-5546 emial:	Energy (gas) and its effect on natural resources, coordination between key actors, road construction, government's responsibility to irradiate with out much compensation.
Susan Bern, Acting Deputy Director, USAID	Calle 9 # 104 Obrajes; 278-5546 emial:	Clearly identify risks, government policy goes from poverty alleviation to social exclusion
Mike Kaiser and Denise Fernández, Economic Opportunities Office, USAID	Calle 9 # 104 Obrajes; 278-5546 emial:	markets for wood, local institutions dedicated to promotional activities in and out of the country, importance of knowing local markets before pressing for international sales.
Daniel Sanchez Bustamante, Food Security Unit, USAID	Calle 9 # 104 Obrajes; 278-5546 emial:	PL-480
Ted Gehr and Jaime Vizcarra, Program Officer	Calle 9 # 104 Obrajes; 278-5546 emial:	Issues and opportunities in natural resource management.
Evelio Arambiza Segundo, Executive Director	Av. Irala # 452, Santa Cruz Tel 3365337, 3370508 Kaaiya@roble.scz.entelnet.bo	Management Kaaiya National Park and TCO
Michael Painter, Ph.D., Regional Coordinator WCS	MPAINTER@WCS.ORG	Historic deal to managed Kaaiya Park between Guarani and Government.
Preston Pattie, Ph.D., Project Director, BOLFOR	Cuatro Anillo Esquina AV. 2 de Agosto Tel: 336-5337, 337-9508 bolfor@scz.entelnet.bo	Two strategies: Industries and community forestry. Patente Forestal too high. Reduce to $.40
Raul Lobos, MS Project Technician, BOLFOR	Cuatro Anillo Esquina AV. 2 de Agosto Tel: 336-5337, 337-9508 bolfor@scz.entelnet.bo	Two strategies: Industries and community forestry
Arturo Moscoso V. (Experto Suplementario), Rudy Guzman Gutierrez, Intendente Técnico Superintendencia Forestal	Av. 2 de Agosto N 6 pasando el cuarto anillo. Cassill de Correos 7091, gusmanz@cotas.com.bo arturomoscoso@hotmail.com	Duties and operations. Special department for indigenous affairs. Problems but working. Might work better if some jobs were contracted out. Would like to change laws, according to lessons learned.
Gerd Resnikowski K. Director Ejecutivo Centro Amazonico de Desarrollo Forestal	Barrio Equipetro Calle 8 Este N 16 Casilla 4081, Santa Cruz, Tel 3-342-4353 gresnikowski@cadefor.org	Markets, Markets and more Markets

Name	Contact	Salient Points
Hermes Justiniano, Director Ejecutivo Funadción para la Conservación del Bosque Chiquitano	Calle Tacna 71 Tel: 3-581-661 hjustin@febcinfo.org	Territorial Planning, funded by ENRON and Shell
Ing. Joaquin Banegas	INRA, Santa Cruz 3344002	Land distribution. 29,000 hectares ready to go. All primary forests
Nils Hager, Forest Official WWF	AV. Beni Calle Los Pitones 2070 Cassill 1633	Community Forestry
CFV Lic MBA Henry Alan Moreno S, Ejecutive Director	Calle Fortin Arce, edificio El Cristo, Cassill 7175 cfvbol@scbbs-bo.com	Voluntary Certification, 1,000,000 hectares., organization not sustainable
Eduardo Gamarra	LACC Florida Int'l Univ., Miami gamarrae@fiu.edu	Conflict Vulnerability
Robert Albro	ralbro@wheatonma.edu	Conflict Vulnerability
SERNAP Jose Argandoña, Seguimiento y evaluacion	MDSyP Av. 20 de octubre 2659 Tel: 2434420 2434472 joseargandona@yahoo.com	Monitoring of Protected Areas Administration
SERNAP Sergio Eguino Director Planificacion	MDSyP Av. 20 de octubre 2659 Tel: 2434420 2434472 <seguino@hotmail.com>	Strategies and conflicts for Protected Areas administration
Robert Wallace Living Landscapes Program WCS	Calle 13 # 594 Obrajes, La Paz Tel: 2786642 2117969	Ecological issues for biodiversity conservation
Lilian Painter, Tacana TCO support program, WCS	Calle 13 # 594 Obrajes, La Paz Tel: 2786642 2117969	Social issues for biodiversity conservation and sustainable use of resources
Peter Cronkleton	Center for International Forestry Research	discussed community forestry in Bolivia
Alicia Tejada Indigenous Communities Coordinator	Superintendencia Forestal	We discussed TCOs
Raul Ruiz	BOLFOR	discussed all aspects of TCOs and ASLs and BOLFOR's project
TCO Yotaú		discussed their program
TCO Santa María		discussed their program
TCO Salvatierra		discussed TCOs in a community meeting
TCO Momené		discussed TCOs in a community meeting
TCO Curuú		discussed TCOs in a community meeting
TCO Yotaú		discussed TCOs in a community meeting
Indigenous Community Members of Guarayos		discussed community forestry issues and community development
Charlotte Benneker	Servicio Holandés de Cooperación al Desarrollo	discussed TCOs in a community meeting
ASL AFOMASAM		meet at their logging camp and discussed their ASL
ASL Cortadores de Madera de San Rafael		meet at their logging camp and discussed their ASL
ASL Guapomó		discussed their newly formed ASL
Einstein Tejada	Project Concern International	discussed integrated community development and community forestry

Name	Contact	Salient Points
Ramiro Suárez Jimenez	Project Concern International	Discussed integrated community development and community forestry
Miguel Mardesich Peréz	Project Concern International	discussed integrated community development and community forestry
Margaret M. Harritt, Equipo de Desarrollo Alternativo. USAID/BOLIVIA	Calle 9 No. 104, Obrajes. Tel. +591-2-2430417. mharritt@usaid.gov La Paz, Bolivia	Utilization and forest products marketing and development in Chapare.
Theodore V. UER, Director Oficina de Estrategias y Servicios Operativos USAID – BOLIVIA	Calle 9 No. 104, Obrajes. Tel. +591-2-2430417. tgehr@usaid.gov La Paz, Bolivia	Sustainable forest products development
Ing. Jaime E. Rojas, Presidente CISMEX S.A.	San Miguel E-22, Tel. +591-2-2793598; Fax +591-2-2799079 P.O. Box 12795 La Paz, Bolivia	LKS. Concessions management and forest products marketing
Ing. Enrique Nelkenbaum, Tahuamanu – Brazil Nuts (Castana Amazónica)	Calle Montevideo No. 109, Piso 9, PO Box 14542 Tel. +591-2-2440081; Fax +591-2-22112869 entahua@caoba.entelnet.bo La Paz, Bolivia	Brazil nut and sustainable forest products development in Pando
Oscar Farfán Mealla, Ministro de Desarrollo Económico	Tel. +591-2-2357829 – 2373096; Fax +591-2-2360534 ofarfan@desarrollogov.bo La Paz, Bolivia	Brazil nut and sustainable forest products development in Pando
Eduardo Polo M., Presidente ASPROGOALPA	Calle Antofagasta No. 20 (Barrio Progreso) Tel. +591-3-38422318; Fax +591-3-38422180 Cobija – Pando, Bolivia	Baracas structure Brazil nut & goma extraction in Pando
Arq. Ronald Calderón, Consultor Asociado Arquitectura del Desarrollo	Av. 11 de Octubre (km 2) Tel. +591-3-8422615 Cel. 715-32323 ronaldcalderon_consultor@yahoo.com Cobija, Bolivia	Sustainable forest resource development in Pando
Alfonso Almaraz, Presidente Ejecutivo AARENARMAPA	FREC. Radio 7625 LSB Tel. 0811-9292 Puerto Rico, Pando, Bolivia	
Ing. Jose Ricardo Shimokawa, Prefecto del Departamento de Pando	Tel. +591-3-38422243; Fax +591-3-38422242	Sustainable forest resource development in Pando
Lic. Julio A. Rojas G., Director Centro de Investigación y Preservación Amazónica – CIPA	Av. Tcnl Cornejo No. 77; Casilla de Correo 280; Tel./Fax+591-3-3842135 Cobija, Pando, Bolivia	Sustainable forest resource development in Pando
Julio E. Etienne Wende, Empresa Agroforestal "San Juan"	Calle Río Yata Tel. +591-3-38523279; Fax +591-3-38572092 Riberalta	Financing and management of NTFP and sustainable forest products development in Pando

Name	Contact	Salient Points
Ing. Clover Paz Quiroga, Presidente Cámara de Exportadores del Noroeste Beni y Pando – CADEXNOR	Tel. +591-3-8522553 Fax +591-3-38572034 Cel. 716-40521 Casilla de Correo 40 cloverpaz@manutata.com Riberalta, Beni, Bolivia	Financing and management of NTFP and sustainable forest products development in Pando
Giovanni Giordano, Gerente Empresa Forestal y Agrícola "BOLITAL"	Av. Del Ejército No. 551 Tel.+591-3-38528173; Fax +591-3-38522226 Riberalta, Beni, Bolivia	Forest products and resources issues in Amazonia
William Cabrera C., Intendente Operativo	Tel. +591-3-3423656; 3488394; Cel. 716-48196 Santa Cruz, Bolivia	SIF lack of fund
Victor Hugo Gutierrez, Jefe Area de Producción Centro Amazónico de Desarrollo Forestal	Barrio Equipetrol Calle 8 Este No. 16, Casilla de Correo 4081 Tel. +591-3-3423773;Fax+591-3-3424353 vhgutierrez@cadefor.org vhgutierez@hotmail.com Santa Cruz, Bolivia	Forest products marketing and utilization
Dr. Robert Langstroth, Gerente Regional Dames & Moore	Calle 6 Este, No. 5 Equipetrol Tel. +591-3-34522800; Fax +591-3-3452802 robert_langstroth@urscopr.com	Natural resources management in Bolivia
Pablo Antelo, Empresa Agroindutrial La Chonta	pantelo@lachonta.com www.lachonta.com	Sustainable forest products markets & door production
Ing. For. José Ledezma A., Especialista en Manejo Forestal Proyecto BOLFOR	Cuarto Anillo esq. Av. 2 de Agosto Tel. +591-3-3480766 – 480767 Fax +591-3-3480854 Casilla de correo 6204 bolfor@bibosi.scz.entelnet.bo Santa Cruz, Bolivia	Silviculture forest inventory seed tree designation
Augusto Gutierrez R., Gerente General Grupo Industrial Maderero CIMAGRO – BERNA	Parque Industrial PI-50 M-3 Via Diagonal IV esq. 6to anillo Casilla de correo 2480 Tel. +591-3-3473467; Fax +591-3-3465077 Nacebe@hotmail.com Santa Cruz, Bolivia	Markets and certification
Katherine Pierront, Gerente Regional Sudamérica Smartwood	Calle Velasco No. 700, Edif. La Riva, 3er. Piso Of. 304 kpierront@smartwood.org www.smartwood.org Santa Cruz, Bolivia	FSC Certification issues & marketing forest products
Roberto Sainz V. Gerente General Aserradero San Martín S.R.L.	Km 10 Carretera NTE. Casilla de Correo 2623 Tel. +591-3-3421259-63-68 Fax +591-3-3421265 asmartin@scbbs-bo.com Santa Cruz, Bolivia	Forest levy forest product industry

Name	Contact	Salient Points
Stephen D. Rosholt, M&E Coordinator Proyecto BOLFOR	4to Anillo esq. Av. 2 de Agosto Tel. +591-3-3480766 – 480767 Fax +591-3-3480854 Casilla de correo 6204 srosholt@bolfor.org Santa Cruz, Bolivia	BOLFOR Project Development and Strategic Planning
Gerd Resnikowski, Director Ejecutivo CADEFOR	Barrio Equipetrol Calle 8 Este No. 16, Casilla de Correo 4081 Tel/Fax +591-3-3423773-3424353-3441171-3425186 cadefor@cadefor.org gresnikowski@cadefor.org Santa Cruz, Bolivia	Forest products marketing production export trade industrial development
Cristóbal Roda Vaca, Director CADEX	Av. Velarde 131 Tel. +591-3-3362030 Fax +591-3-3321509 cadex@cadex.org www.cadex.org Santa Cruz, Bolivia	Sustainable forest products and certification exports sustainable forestry
Abraham Guillén, Rainforest Alliance	65 Milles Street, Suite 201, Richmond, VT 05477 Tel. +802-4345491 Fax +802-4343116 aguillen@smartwood.org www.rainforest-alliance.org	BOLFOR Forest product sector industrial development certification
Philip A. Araman, Project Leader USDA Forest Service	1650 Ramble Road Blacksburg, VA 24060 Tel. +540-2315341 Fax +540-2311383 paraman@vt.edu	Forest products and marketing
Luiz Renato Durksi Jr., Marine Box	Runa Jaime Reis, 254 – Sao Francisco (Largo da Ordem) Tel. +55-41-3237370 Fax +55-41-3236261 fastimber@onda.com.br Curitiba, Brazil	Brazilian market for Bolivian LKS & commercial species
Aernout Weeda, Director General KADASTER	Av. Arce No. 2942 – San Jorge Tel./Fax +591-2-2430091 – 2431528 kadasbol@ceibo.entelnet.bo La Paz, Bolivia	INRA pay no almost attention to land capability. Urgent for municipalities to prepare land use plans
Arturo Bowles, General Manager Forest Chamber of Bolivia	Prolong. Manuel Ignacio Salvatierra,1055 Tel. +591-3-3332699; Fax +591-3-3331456 Foresbol@cotas.com.bo Santa Cruz, Bolivia	The primary forest products industry lacks incentives. Illegal logging undercuts prices for sawnwood.

Name	Contact	Salient Points
Lic. Patricia Olmos. Presidente FONAMA	Calle Mercado No. 1328, Edif. Mariscal Ballivián Mezzanine Tel.+591-2-2330892 – 2201888 – 2201813; Fax +591-2-2201796 Presidenciafonama@mail.megalink.com La Paz, Bolivia	Protected areas
Ing. Guillermina Jimenez, Consultora en SIG, Servicio Nacional de Información para el Desarrollo Sostenible – SNIDS	Calle Prolongación Federico Zuazo No. 2161, Edif. Alexandría PB; Tel. +591-2-2444386; Fax +591-2-2440462 Gjimenez@snids.bov.bo La Paz, Bolivia	GIS data on protected areas, ecoregions, etc.
Ing. Roberto Mobarec, Geólogo Senior Servicio Nacional de Geología y Mineria	Calle Federico Zuazo No. 1673 esq. Reyes Ortiz Tel. +591-2-2312745 int. 250; Fax +591-2-2312748 Robertomobarec@hotmail.com La Paz, Bolivia	Location of mines and mineral potential
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Marianela Curi, Directora de LIDEMA	Liga Nacional de Medio Ambiente	Training in community forestry
Lic. María Soledad Quiroga, Coordinadora de las Transversales de la Reforma Educativa	Ministerio de Educación – Reforma Educativa	Educación y comunicación ambiental
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Appendix D: Threats, Opportunities and Strategies

Major Issues in the conservation of natural resources presented in workshops and in personal interviews.

Table D.1. Threats, opportunities and development strategies in natural resource management (1)

Issues	Threats	Opportunities	Major strategies
Forest management	• Lack of political support, public awareness, adequate policies and incentives. • Weak institutions (*SIF* and municipalities). • Juridical insecurity. • Ineffective coordination between institutions. • Undefined land tenure rights. • Legal and illegal colonization. • Extreme poverty. • Forest fires.	• Forestry law. • Agrarian Reform law. • Advanced management technologies and methodologies. • Advances in certification. • Local support for management. • Markets for certified wood. • Donor support. • Numerous national and int'l agreements for forest management.	• Improve policies and create incentives for management. • Increase areas under management. • Increase production. • Support *SIF* and municipalities. • Revise cost and distribution of the forest levy (*patente*). • Create subsidies for tree plantations. • Continue research on silviculture • Work with IBAMA. • INRA: improve policies related to forests. • Promote integrated management.
Industry	• Lack of incentives. • Illegal logging; • Commercialization of few species. • Inefficient forest product industry and • weak negotiating skills. • Lack of foreign investment, few joint ventures, poor knowledge of markets. • High production and transport costs. • Decreased market in Argentina and increased illegal timber trade.	• Abundant resources. • Talented professionals. • Advances in wood technology. • New credit. • New incentives for small Businesses and exportation	• Reduction of illegal harvest and wood traffic. • Train communities. • Study production chains • Support to CADEFOR and the Forestry Chamber of Commerce. • Commercialization of more species. • Continue progress in certification. • Implementation of new incentives. • Lower production costs and research on production chains. • Campaign promoting wood products. • Communities need different incentives. • Increase alliances/joint ventures

Table D.2. Threats, opportunities and development strategies in natural resource management (2)

Issues	Threats	Opportunities	Major strategies
Protected Areas (PAs)	• Colonization, coca growing and deforestation in some PA's. • Poor coordination between central government offices, *prefecturas*, municipalities and SERNAP. • Unstable funding for SERNAP; • Weak PA legislation, conflicting with hydrocarbons and mining. • Unrepresented ecological zones in SNAP. • Lack of management plans for some areas. • Insufficient and untrained personnel for PA management.	• Extensive areas and biological diverse 'hotspots' declared as PA. • Active local participation in the administration of PAs through *comités de gestion*. • Good experiences of joint PA management with NGOs and indigenous groups. • International interest to support PAs. • Ecotourism shows potential to generate income for local communities and the PA.	• Improve people's participation in the management of all PAs. • Improve coordination between SERNAP and other offices at the central government. • Improve regional coordination of PAs with research institutions, NGOs, and the private sector. • Complete the design and implementation of a strategic plan for the SNAP. • Develop and implement a monitoring and evaluation system for SERNAP. • Upgrade the legal framework for PAs with a new law. • Support municipalities and *Prefecturas* • Promote ecotourism. • Combine use with protection. • Educate in and conduct awareness programs in biodiversity.
Wildlife	• Lack of regulations. • Uncontrolled hunting and plant collection. • Corruption and illegal trade. • Lack of trained personnel and means at *prefecturas* and municipalities for management and law enforcement. • Juridical insecurity. • Lack of information on wildlife habitats and reproduction. • Colonization, deforestation and wildfires.	• Large natural habitats. • Support from indigenous. Support from communities, NGOs, support groups and political interest. • High potential economic value.	• Fight corruption. • Elaborate improved laws and regulations. • Empower local communities in wildlife management. • Develop pilot projects of biodiversity management. • Train professionals and local actors in management of wildlife. • Back support groups. • Orient research towards management. • Promote sport hunting and fishing.

Table D.3. Threats, opportunities and development strategies in natural resource management (3)

Issues	Threats	Opportunities	Major strategies
Community forestry	• Misunderstood definitions. • Lack of conviction. • Lack of trained personnel. • Lack of policies and incentives. • Weak community organizations. • Lack of productive alternatives.	• Several experiences to build on. • Strong support from Communities and socially minded advocates. • Participatory methodologies and production systems validated. • Laws and regulations activated that support community participation in resource management. • Numerous non-wood products unexplored.	• Indigenous management of TCOs in tropical zones. • Agroforestry in the Andean highlands. • Associations of like-minded colonists for forest management. • Non-wood forest product enterprises run by ethnic groups. • Control and management of wildlife by local communities. • Integrated farm management plans. • Ecotourism in communities. • Continue with certification. • Small enterprises with women.
Education – Communication	• Lack of public awareness. • Inadequate curricula development. • Social exclusion and conflicts between ethnic groups. • Low pay and frequent move of teachers; • Lack of infrastructure. • Poorly trained teachers.	• Increasing expectations; • Technical forestry schools; • Good professionals willing to improve education; • Donor interest; • Abundant information and technical advances in internet.	• Awareness programs featuring urgent environmental issues (colonization, deforestation, fire and contamination). • Improve university pensum in communication, wildlife management and biodiversity, community forestry, globalization and international markets.
Clean Production	• Uncontrolled use of dangerous chemicals. stream contamination with fecal material, uncontrolled use of fire for land clearing.	• Increasing public awareness. • Donor interest. Concerned industries.	• Public awareness campaigns to prevent chemical and fecal contamination and wildfires. • Treatment of sewerage.

Appendix E: Collaborative Program Recommendations

Table E.1. USAID internal collaborative programs*

Participants	Forest Management	Livelihoods	Protected Areas	Forest Industries
USAID/Bolivia	• Utilize an interdisciplinary team approach and a coordinated Mission strategy to facilitate accomplishment of all SO objectives through a focus on Forest Management. • Coordinate cross-sectoral education and communication programs to accomplish objectives of all SO teams including forest management training, building advocacy and constituency for policy, and disseminating research results.	• Utilize an interdisciplinary team approach and a coordinated Mission strategy to facilitate accomplishment of all SO objectives through a focus on Alternative Livelihoods. • Coordinate cross-sectoral education and communication programs to accomplish objectives of all SO teams including promotion of participatory development, training in ecotourism and community planning, and wildfire prevention.	• Utilize an interdisciplinary team approach and a coordinated Mission strategy to facilitate accomplishment of all SO objectives through a focus on biodiversity conservation. • Coordinate cross-sectoral education and communication programs to accomplish objectives of all SO teams including training in PA mgmt. and facilitation of communication between communities and other entities.	• Utilize an interdisciplinary team approach and a coordinated Mission strategy to facilitate accomplishment of all SO objectives through a focus on Forest Industry development. • Coordinate cross-sectoral education and communication programs to accomplish objectives of all SO teams including training in efficient processes, promotion of market opportunities, and marketing of LKS.
SO1: Democracy	• Facilitate integration of NRM and land use planning into municipal planning units (e.g., through existing municipal forest units).	• Development and training in participatory methodologies. • Promote and train in networking of sustainable management.	• Help develop legal framework for PA's and biodiversity conservation. • Support networking for conservation in the regions.	• Promote participatory actions in reform of Forestry Laws and legislation. • Support efforts to combat corruption/ illegal logging.
SO2: Economic Growth	• Improve policy incentives for forest management and export markets. • Support research on the chain of production for wood and non-wood forest products through the Foundation for the Tropics.	• Microfinance for community forest enterprises. • Local enterprises for non-wood forest products.	• Support communities and municipalities to design and execute ecotourism. • Assist communities and private businesses to develop trekking, sport fishing and hunting programs.	• Support free trade agreements. • Promote investment. • Promote better business and entrepreneurial practices. • Assist in trade and marketing of wood products and NTFP. • Promote efficient manufacturing technologies and maximize wood recovery. • Develop appropriate technologies and flexible manufacturing networks. • Promote materials and LKS research. • Assist in development of *centros de acopeo* and technical support
SO3: Health	• Design methods to channel forest management income to local health programs.	• Design and implement community health programs.	• Conduct health programs in critical areas for leishmaniasis (Madidi, NKM). • Develop clean water supply for selected communities in protected areas.	• Promote worker safety and protection. • Promote use of potable water in remote harvesting sites. • Minimize health risks of wood dust irritants in manufacturing.

Participants	Forest Management	Livelihoods	Protected Areas	Forest Industries
SO4: Environment	• Support applied research on forest ecology, fire management, tree regeneration, and non-wood forest products such as castana.	• Analysis and disseminate lessons learned in community forestry in collaboration with FAO, the Dutch, CARE and WCS. • Assist in the design and negotiation of community forestry projects in the highlands and lowlands.	• Support research activities in management of wildlife and other non- timber forest products. • Facilitate coordination between GOB, NGOs and communities for management of wildlife and non-timber forest products. • Support participatory development, wildlife management, etc. training of personnel responsible for protected areas.	• Support industry research & development in timber harvesting and primary manufacturing. • Support initiatives to integrate community forestry and sustainable timber harvesting activities into industrial wood flow. • Promote training and education of communities in SFM and development of wood-based industries. • Assist communities and industry in certification, LKS wood products and NTFP marketing.
SO5: Alternative Development	• Promote forest management to stabilize farmer income. • Assist development of alternative forest products.	• Validate and disseminate productive alternatives. • Continued project financing in lowlands and other areas as determined necessary.	• Prevent the expansion of coca into protected areas (Carrasco, Isiboro Secure, etc.) thru buffer zone mgmt (land titling, border demarcation, alt. income production activities, strengthening monitoring activities by the parks, etc.). • Help assess the situation in other vulnerable protected areas (Amboro, Altamachi).	• Assist development of alternative forest products in coca growing areas. • Promote cash cropping of fast-growing leguminous species and NTFP. • Promote research in species and provenance trials.
Title II: Food Security	• Assist municipalities with watershed planning and reforestation programs in Food Security areas.	• Integrate community forestry activities into current and future projects. • Continue to finance activities in natural resource management.	• Support community management of natural resources of inhabitants of Protected Areas.	▪ Promote efficient production of Brazil nuts.
Embassy	• Promote the economic and environmental importance of and negotiate policy for sustainable forest management.	• Promote and disseminate participatory development activities conducted by USAID and partners.	• Conduct awareness campaigns for protected areas and biodiversity in general. • Promote international treaties for conservation of biodiversity.	• Promote international trade for forest products. • Promote use of certified wood products for USAID and embassy facilities.

**Activities marked in bold have not previously been considered in USAID/Bolivia draft Concept Papers.*

Table E.2. External collaborative programs

Participants	Forest Management	Livelihoods	Protected Areas	Forest Industries
Local and International NGOs	• Assist TCOs ASLs, municipalities, and government with technical and administrative support.	• Design and execute participatory extension programs. • Train in community forestry, leadership and participatory development	• Prepare and implement management plans in San Matias, Otuquis, Madidi) with FCBC, WWF, WCS, and partners.	• Support CFV and SmartWood. • Support *Fundación Pando* in SFM. • Support *Funda-Pro* in development of *centros de acopeo*.
Public Development Institutions	• INRA – coordinate with forest management.	• Regulate the promotion and execution of community forestry development programs.	• Work with SERNAP for sustainable management of protected areas. • Utilize participatory methods in creating community and municipal forest plans.	• Assist SIF, MC and M DSP in the promotion and certification of LKS, wood products and NTFP.
Forest Industries	• Develop markets for TCO and ASL wood products.	• Win-win collaborative agreements • Develop products and markets for community wood and non-wood forest products	• Work with communities to develop markets for non-wood forest products.	• Assist CADEFOR, Camara Forestal de Bolivia, CADEX, CANEB, BOLINVEST, Exportimo, in promoting trade and marketing of sustainable forest products. • Support international marketing efforts of CFPC, GFTN, WWF-World Bank Alliance in marketing certified wood products.
Universities and Research Institutions	• Research new technology and silviculture. Train new foresters.	• Improve curricula in participatory development and natural resources management by communities.	• Cooperative alliances of regional research institutions, Museo NKM, and Institute of Ecology for applied conservation research and training of local professionals and technicians in management.	• Continue to cooperate on research of LKS, sustainable wood products and NTFP with University of Urecht, Universidad Privado de Santa Cruz, University of Florida. • Coordinate research on utilization and marketing of LKS with IBAMA, ITTO, IUFRO, CIRAD, USDA/FS-FP CIFOR, CSIRO, TRADA and FORINTEK.
International Development Agencies	• Provide funding, technical assistance and policy support.	• Provide funding and technical assistance. • Analyze lessons learned in community forestry development projects in the highlands and the lowlands.	• Support cooperative alliances between government, NGOs and research institutions.	• Continue to work with industry to find financing from SIDA, IADB, World Bank, CAF for trade and marketing of sustainable wood products and NTFP.