



INTER-AMERICAN DEVELOPMENT BANK

**STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE
SANTA CRUZ - PUERTO SUAREZ CORRIDOR
BOLIVIA**

(PROJECT No. TC-9904003-BO)

FINAL REPORT

EXECUTIVE SUMMARY

CONSORTIUM

PRIME

PRIME Engenharia

BRAZIL



Museo Noel Kempff Mercado

BOLIVIA



Asociación POTLATCH

COLOMBIA

JULY, 2000

PRESENTATION

This document is the Final Report of the Strategic Environmental Assessment (SEA) and review/complementation of the Environmental Impact Study (EIS) of the Santa Cruz – Puerto Suarez Transportation Corridor Project.

The document has been prepared by the Prime Engineering – Noel Kempff Mercado Museum – Potlatch Association Consortium, in the context of the Contract agreed to with the Inter-American Development Bank (IADB) on October 26, 1999.

The document is structured in eight volumes, with the following main content:

- **Volume 1/8:** Contains the EIS and SEA Executive Summary
- **Volume 2/8:** Contains Project Description (of the highway project), Analysis of Project Alternatives, and the Definition of the Project Areas of Influence.
- **Volume 3/8:** Presented in two Sections A and B, contains the Social – Environmental Base-line study of the Area of Indirect Influence (AII).
- **Volume 4/8:** Contains the Social – Environmental Base-line study of the Area of Direct Influence (AID according to the Spanish Acronym) and the Intervention Area (AI according to the Spanish Acronym), as well as the Political, Legal and Institutional Framework.
- **Volume 5/8:** Contains the Impact Analysis and Mitigating Measures as identified by the EIS.
- **Volume 6/8:** Contains the Environmental Management Plan for the EIS
- **Volume 7/8:** Presented in two sections A and B, provides information on Secondary, Long-term Impacts and Future Scenarios, as well as an Action Plan as part of the SEA. This chapter also contains a description of the Project Geographic Information System (GIS)
- **Volume 8/8:** Contains several maps (0.90 x 1.20 M) illustrating components of the EIS and SEA.

There are also three annex volumes:

Annex 1: Contains Report on Phase one of the Public Consultation

Annex 2: Contains Report on Phase two of the Public Consultation

Annex 3: Contains Photographic Documentation of the Consultancy.

According to terms of the Contract, ten sets of the document have been distributed to IADB and the Bolivian Government, as specified by the IADB. The document has also been provided in a digital format and a complete version of the document, including the maps, will be distributed on CD-ROM.

The study is fully integrated as part of a Geographic Information System (GIS) incorporating information for all of the AII and is resident in the Noel Kempff Museum information system. The GIS incorporates digital images derived from aerial videography documenting the current conditions of entire highway right of way (ROW).

The studies were completed during a 10-month period, starting October 4, 1999. Pursuant the contract and further agreements, the following intermediate products were produced:

- First Draft of the Programs, on December 20, 1999
- Progress Report N^o 1, on February 9, 2000
- Progress Report N^o 2, on May 28, 2000

This Final Report includes the observations received from the IADB and the Bolivian Government following their evaluation of these preliminary reports.

The studies were carried out with ample consultation and participation by the public, the national government and local authorities. Consequently, the results reflect not only the technical analysis of the impact of the transportation Corridor, but also the communities' opinions and expectations.

Two complete rounds of Public Consultation took place, with a total of 24 workshops (13 in municipalities and 11 with indigenous populations), where nearly 1000 citizens participated, many as formal representatives of their communities. Attendance records show that representatives of the majority of the rural, indigenous, and peasant farmer communities from all six municipalities that are most directly involved in the Project, participated in these workshops.

The population directly affected by the highway Right of Way was consulted regarding the impact and their expectations of compensation. As part of a wide-ranging field survey, meetings were held in all the affected rural communities and urban nuclei involving individual land owners.

In addition to the Consultation workshops, the team organized several technical meetings and seminars on specific issues, such as land titling processes, Indigenous Peoples Development (PDPI), protected area management, institutional strengthening, public participation, so as to ensure consensus on the proposals incorporated into the Programs of the Environmental and Socioeconomic Action Plan. Additional contacts and meetings were held with authorities, governmental technicians, indigenous leaders, representatives of social sectors, business guilds, and non governmental organizations (NGOs), in order to collect information and exchange ideas on the variety of issues under discussion.

The execution of field work for the physical and biotic surveys, engineering studies, and especially the socioeconomic surveys constituted important opportunities to learn the population's vision and experience of the social and environmental problems in the region.

The monthly meetings with the Participation and Consultation Committee were of special importance, since the members made observations, criticism and valuable contributions to the Consortium's work, allowing it to enrich its study and fine tune its conclusions according to society's expectations,

The *Prime – Museo – Potlach Consortium* mobilized a team of 70 people for the study, most are Bolivian residents with the participation of key international consultants. All worked with dedication and professionalism to ensure innovative and effective solutions for Environmental and Social Protection in the Area that will be affected by the construction of the Transportation Corridor.

The progress reports previously presented by the Consortium have been evaluated by the Government and the IADB; these reports covered in detail the themes defined in the Scope of Work. Consequently, with the additions and corrections added in this Final Report, the Consortium considers that it has faithfully fulfilled the Contract Terms of Reference with regard to content, as well as the requirement to ensure the participation of the population in the development of the study and recommendations.

Santa Cruz, July 31, 2000.

FINAL REPORT SUMMARY

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Presentation

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Presentation

Professional Team Responsible

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ANNEX 1: Report on Phase one of the Public Consultation

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**STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)
AND
REVIEW AND COMPLEMENTATION OF THE
ENVIRONMENTAL IMPACT STUDY (EIS)
FOR THE
SANTA CRUZ – PUERTO SUAREZ TRANSPORTATION CORRIDOR**

EXECUTIVE SUMMARY

1. PROBLEM PRESENTATION, CONCLUSIONS AND RECOMMENDATIONS

The construction of a highway between Santa Cruz and Puerto Suarez is an old aspiration of the Bolivian Government and the regional population. This 600 km axis between the city of Santa Cruz and the Brazilian border (next to the city of Corumbá) is connected by railroad and by a primitive road that is essentially useless during the rainy season.

It is necessary to improve this transportation corridor for the following purposes:

1. Improve the efficiency of the export corridor between the agricultural production region surrounding Santa Cruz and the Puerto Aguirre Waterway terminal on the Paraguay – Parana waterways, with links to oceanic transportation;
2. Improve the competitiveness of the productive sectors established in Santa Cruz (soybeans, lumber, meat, other agri-industrial products), by reducing transportation costs for supplies and products, as well as creating greater access to the production areas;
3. Promote social and economic development of the far-eastern region of Bolivia, which has hitherto been hindered by difficult access.
4. Complete the missing link for the inter-oceanic land transportation route and promote economic integration in the MERCOSUR countries, especially between Bolivia and Brazil.

The export of agri-industrial products and the import of Brazilian and other commercial products between Puerto Suarez-Quijarro and Santa Cruz is done mainly by railway. The monopoly held by the Empresa Ferroviaria Oriental (EFO) and the infrastructure deficiencies of EFO result in high rates and inefficient services. Investments made by EFO after the capitalization process have improved the situation, but only bulk cargo, such as soybeans have integrated their logistic systems to benefit from these improvements. In contrast, most of the local economic players pay a high price for low-quality services.

The railway, which is under private management, functions according to a logical economic rationale: site to site transportation of bulk cargo. The function of putting regional economic activity in motion, interconnecting thousands of small scale producers and consumers within the territory, and establishing an efficient market, can only be achieved by road transportation, which has the flexibility to adapt to multiple scales and needs. The missing backbone is a modern highway that can be used year-round and which is designed for the projected traffic volume.

The Santa Cruz - Puerto Suarez Corridor project, presented by the Bolivian national government to the IADB for financing, includes:

- Implementing 566 km of highway with a raised gravel surface between Pailon and Puerto Suarez, connecting with sections already paved on each terminus; and
- Building a 1404 m bridge over the Rio Grande, plus 4.4 km of access routes to resolve an existing bottleneck located at the river crossing caused by a one-way railway bridge, that generates long lines and hours of traffic delays.

The total direct investment in this construction project is US\$ 250 million and will involve several financiers. Highway and bridge construction is foreseen to be carried out in four major stages (the bridge and three sections of road), with each stage lasting 2.5 years each, spread over a total of 4.5 years starting in January 2002, and ending in June 2006.

Feasibility studies have shown that the Project is viable, even with the modest traffic projections based only on the demand generated within national territory. The Corridor's function as a bi-oceanic link between Brazil and ports on the Pacific Coast is an uncertain possibility that has not been taken into consideration as economic justification for the project. In the event that this additional use is manifest at high levels upon completion of the road project, the paving of the highway may become feasible as a private concession.

The regional population, especially the municipalities along the Corridor axis, demand the construction of the highway. They justifiably visualize it as an end to their economic isolation and permit their integration into the regional economy, permitting them to participate in the economic growth that has characterized Santa Cruz in the past decade. Public support for the highway is manifest, in greater or lesser degree, in all the social sectors.

In spite of the social need, the economic importance, the presence of strong local support, and the priority it has been given by the national government, the implementation of the Corridor Project has progressed slowly in the past few years. Bolivia can only undertake investments of this magnitude by means of grants and resources from multilateral lending agencies and international cooperation. Budget limitations are compounded by the priority assigned to other projects, especially reforms being undertaken within the economic, social and institutional sectors of the country. In addition, the Corridor Project itself has been the cause of controversy due to the social and environmental impacts that its construction will cause.

Without the appropriate orientation and the development of sound social-environmental guidelines the Project will not meet the conditions for approval by international financiers. Consequently, the preparation of a Strategic Environmental Assessment (SEA) and the complementation of the Environmental Impact Study (EIS), that incorporate the Multilateral Banks' guidelines were steps agreed upon by the Bolivian national government and the IADB, in order to:

1. Verify under what conditions the Project is environmentally and socially viable;
2. Establish an Environmental and Social Management Program and identify the economic resources necessary to implement the priority actions in the area of influence of the Corridor, and
3. Establish the benchmarks to be met as criteria for the disbursement of economic resources for the project, with the goal of assuring that the mitigation measures are efficiently implemented in a timely manner, and that there are conditions in place to reach the proposed objectives.

Concerns regarding the highway's environmental and social impact are completely justifiable. The influence area shelters an enormous natural area that is largely pristine, containing valuable ecosystems such as the *Chiquitano Dry Forest*, *Gran Chaco Forest*, *Cerrado Savannas*, and the *Gran Pantanal Wetland*. Of particular importance are the inherent limitations of the soil resources in the region, with the exception of a restricted area of relatively fertile soils in the region known as the *Eastern Lowlands* or more recently as the *Agricultural Expansion Zone*¹.

Experience in other parts of the world in the past decades show grave environmental consequences resulting from new highways in previously remote areas; improved access induces rapid expansion of the economic

¹ An area of approximately 100 km east of the Rio Grande river, where the Lowlands Project, financed by the World Bank, induced rapid conversion of forests to agricultural areas.

frontier, for colonization, agriculture, ranching establishments, lumber exploitation, etc. This results in massive deforestation, degradation of ecosystem functionality and the loss of biodiversity. The *Eastern Lowlands Project* in Santa Cruz, as well as the construction of BR 364 in Rondonia, and the Cuiaba–Santarem road in Mato Grosso in Brazil are recent examples in nearby geographic regions that clearly demonstrate the phenomena that will be unleashed.

The principal mechanism that foments both territorial occupation and deforestation is the increase in the value of land and the accompanying speculation caused by outside financial capital. The productive sector and its participants mainly enter into the equation after land values are rising and after deforestation is fully underway. The process can seem highly irrational, with the “productive habilitation” of areas whose use is severely limited over the long- to medium-term; in these instances, these lands are degraded and are either abandoned or are converted into large-scale cattle production. Bolivia will lose in three separate and distinct ways by such an irrational development process: (i) lose ecosystem resources and biodiversity in the area, (ii) squander the long-term lumber production obtainable via sustainable management practices, and (iii) poorly invest capital resources in projects with a relatively low rate of return over both the medium and long term. Everyone loses, except the speculators that secure dubious rights to land and make their profit before reality shows its face.

The risk that this process will occur in the Corridor Area of Influence is particularly high due to the confusing state of the land-tenure situation in Bolivia in general and in the region in particular. The land reform and titling process prescribed by the National Agrarian Reform Law (known as INRA by its Spanish Acronym) has practically made no progress. Many of the claims filed under the previous systems show enormous territorial overlap. There are numerous and blatant cases of private seizure of public lands, where individuals have “planted files” that lack the legal steps required by the law and which consist of properties that do not fulfill an “economic and social function”, as they are clearly established in pristine areas devoid of human occupation.

In the past years, important progress has been achieved in the designation of areas as protected areas, including: the 3.4 million hectare Kaa-Iya Gran Chaco National Park and the Natural Area of Integrated Management (ANMI – Spanish language initials), similar management areas in the Pantanal de Otuquis measuring 1.0 million hectares, and the San Matias ANMI measuring 2.9 million hectares. Only Kaa-Iya, which is under the administration of the organization of the Guarani People (CABI) has made significant progress in implementing a viable management mechanism, using support from Wildlife Conservation Society and USAID, as well as resources granted as part of the compensation from the Bolivia – Brazil Gas pipeline. San Matias still has a fledgling administration, while Otuquis is devoid of any type of management structure. Even considering the strengthening of the National System of Protected Areas (SNAP – Spanish language initials) under the GEF–II project, that will be undertaken soon, the concrete perspective is that improved access will cause irreversible occupation, habitat fragmentation, and ecosystem degradation in these areas, which are essentially protected only by paper documents.

Socially speaking, the situation is no less serious. The region shelters a considerable social and ethnic diversity: the urban population (mainly low income), indigenous peoples (Chiquitanos, Ayoreos and Izocéño-Guarani), peasant farmers, colonists from other regions of the country, Mennonite colonists, small scale landholders, cattle ranches, agricultural companies, day laborers, etc. The confused land-tenure situation, in combination with severe rural poverty, creates a scenario where the less affluent sectors are highly vulnerable and these will be disenfranchised if steps are not taken to protect their rights.

The IPDP for the Bolivia – Brazil gas pipeline, and later the IDP for the lateral Cuiaba gas pipeline, established programs to support the land-titling process for indigenous lands. This was a very important step that has allowed: (i) the revalorization of ethnic identity, particularly among the Chiquitanos, (ii) strengthening of indigenous organizations and (iii) considerably advancing the land claims of the indigenous groups (known as

TCOs) and other community lands. The process has not yet concluded, and there are claims for additional TCOs that are being prepared and that will be presented to INRA in the near future.

Peasant farmer communities, small scale landowners, and individual title holders are also in a position that is judicially fragile, since they typically occupy land with no legal title, and for which they aspire to achieve legal title.

The new INRA law and its regulations represent important steps forward, creating the legal and institutional instruments for a fair land distribution. However, an eventual “case by case application” (known as SAN-SIM at request of the interested party), the non-specific guidelines for defining “social and economic function”, the complexity (and cost) of the paperwork, and existing legal confusion, may lead to the eventual inapplicability of the land-titling system. Consequently, there exists a large probability that intervention of prevailing political interests will result in the social exclusion of the less affluent, consisting principally of the actual rural population.

The development induced by the highway will bring together the interaction of modern production systems, that are fully integrated into global commercialization system with traditional subsistence based agricultural methods, as well as an increasing rural middle class. The increased value of the land and the permeability of the Chiquitano and peasant farmer communities for new members will accentuate the already existent social differentiation processes and accelerate the process of private appropriation of community lands. That is, the risk that the poorest sectors will be “expelled” does not originate solely in eventual legal procedures, but also as a complex natural tendency for a small sector of society to take over the better part of the benefits brought about by development.

The region’s relative isolation has made it possible for the protagonists of these processes to live together for years with these problems. The difficult access limited the pressure on the soil and the impact on the most vulnerable ecosystems and populations. There is already increased economic movement (jobs, investments) and speculative activity, due to the construction of the two gas pipelines and the expectations surrounding the highway construction. In the future the greater accessibility will increase property value, and will tend to expand the economic occupancy frontier, and accentuate the social and environmental conflicts.

In the institutional field, the situation is ambiguous. On the one hand, the country has a rather advanced legal framework, the product of a series of reforms put into effect in the past few years. We can highlight the Environmental Law, the Agrarian Reform (INRA) Law, the Forestry Law, the Popular Participation Law, and their respective regulations. In addition, the PLUS zoning program (Soil Use Plan in Santa Cruz) and the General Regulations for Protected Areas provide a workable framework for land-use planning. The country has also advanced in the creation of institutions in charge of implementing these laws and the management of potential conflicts. However, the institutional capacity to execute these tasks is weak in general and their presence in the field is often nonexistent.

Analysis of the legal framework and the competency of the responsible institutions shows that, theoretically, there are existing instruments for social and environmental management of the processes and risks described. There are very few cases in which new laws would be necessary (Law for the Conservation of Biological Diversity), or changes would have to be made to laws already in effect. However, the examples where new regulations and/or administrative mechanisms must be improved are numerous and essential. Nonetheless, the institutional limitations show that the State does not intervene effectively to enforce the spirit of the law or to provide order for the development process.

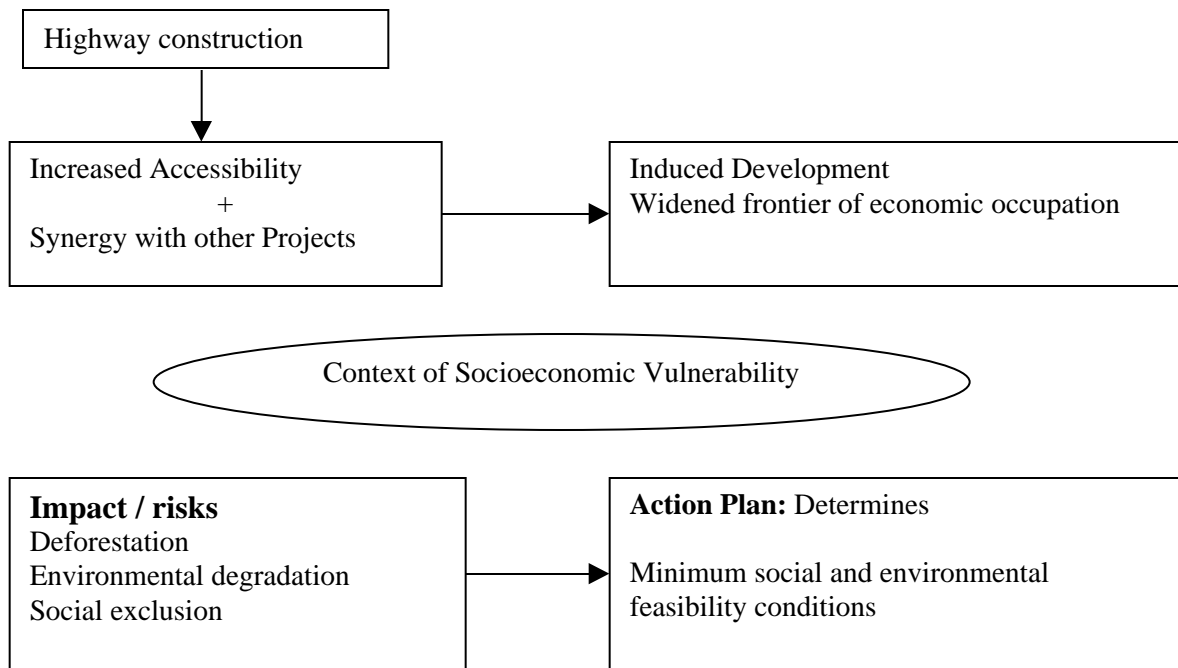
In the social arena, it is the Consortium’s impression that the general understanding within the population of the risks and the extent of the changes that the future holds is severely limited. Social demands made by the

population are concentrated on the understandably immediate concerns to relieve the dire needs for basic services. Indigenous people and peasant farmers also demand land titling support and assistance for increasing agricultural productivity. There is an important degree of grass roots organization, although its capacity for action is weak in spite of their insistent demands to participate in the decision making process.

This is, in concise synthesis, the scenario that profiles the implementation of a highway under current conditions, assuming that no additional actions are taken, other than those that the law imposes as an obligation for the party legally responsible for the project to mitigate the direct impacts.

The first conclusion is that there is a gap between the need and the priority given to the project, and the institutional capacity in place to control the negative effects on the environment and the most vulnerable social sectors. This is the challenge that the Action Plan for the Strategic Environmental Assessment hopes to meet.

In summary, the basic mechanism considered in the Strategic Environmental Assessment is the following:



The environmental evaluation provides: (i) a comprehensive environmental and social diagnosis of the project's several areas of influence; (ii) An ample process of Public Consultation and interaction with the National government and with the various local social sectors involved; (iii) the analysis of the project's indirect, synergetic, accumulative and long term impact, resulting from the development caused by the Corridor in interaction with other projects; (iv) the construction and evaluation of long-term scenarios in order to visualize the region under different hypothetical actions; (v) design of preventive, mitigating and compensating measures for the impact; (vi) organizing these measures in a group of programs to plan their execution; (vii) design a participation-focused institutional and project management system.

The entire environmental evaluation process took place in a participation context, and therefore it can be said that the results presented herein are not only technical analysis, but also the community's opinions and expectations.

The fundamental conclusion is Conditional Social–Environmental Feasibility. In order to become socially and environmentally feasible, the Santa Cruz – Puerto Suarez Transportation Corridor requires the implementation of a wide array of protective measures, some under the responsibility of the *Servicio Nacional de Caminos*, and many others under the competency of other government entities.

Moreover, the nature of the impacts requires preventive actions, implying that an important and decisive part of those measures must be implemented prior to beginning construction, and that other must follow the work schedule *pari passu* (and the respective financing disbursements).

The following is a summary of the main actions required to insure the Project's social–environmental feasibility. More elements and justifications are presented throughout this Executive Summary. The complete documentation of the environmental evaluation is in the various volumes of the Final Report.

1. Loss Compensation and Socioeconomic Rehabilitation of the Affected Population

- Indemnify for the land and the improvements at replacement cost, for all the land owners and occupants affected (collective and individual persons); implement mitigating measures as indicated, such as fencing off the frontage of the ROW, cattle passes and drinking ponds.
- Replace the land and indemnify for improvements at replacement cost for all indigenous communities and peasant farmers impacted. Implement mitigating measures as indicated, such as wiring off the frontage of the ROW, rural markets, indigenous cultural centers, cattle passes and drinking ponds.
- Replace impacted rural homes, subject to required quality pattern.
- Implement an urban resettlement project in Robore, pursuant indicated guidelines
- Develop the program with public participation of the affected persons through co-management committees.
- Conclude indemnification for land, improvements, and home replacement no less than one month prior to the start of construction work in each sector.

2. Environmental Construction Plan (PAC – Spanish language initials)

Include PAC norms in the specifications for the bids for the construction work, and make their fulfillment mandatory for the Contractors, Engineering Supervisors and the Servicio Nacional de Caminos. Create and implement a Conduct Code, widely publicize it and demand its strict obedience from all participants in the Project.

3. Environmental Supervision and Monitoring

- Create an Environmental Supervision and Monitoring System separately from the Engineering Supervision with the characteristics indicated by the EIS.
- Hire the services of a company specializing in Environmental Supervision and Monitoring for the work, including a team of social and environmental inspectors.
- Include an Environmental Auditor, the Supervisory Committees and an Ombudsman in the System.

4. Environmental Mitigation in the Work Area and Surroundings

- Replant the intervened areas, as indicated in the program
- Correct the environmental liabilities left by previous interventions surrounding the highway.

5. Social Communication

- Implement a proactive communications system with the community, in order to provide timely and accurate information to the various social sectors.
- Develop mechanisms for interacting with the local population.

6. Dangerous Cargo Transportation Management

- Implement a pilot program as a first step towards adjusting the norms and training of Bolivian organizations to the agreements on this subject signed by MERCOSUR nations.

7. Complementary Works

Include, as a minimum, the following complementary interventions in the roadway Project:

- Improved access to all the settlements found less than 3 – 4 km from the main highway, so they will be functional year – round.
- Institute a parallel rustic path for cattle circulation and animal drawn carts and wagons, in those areas where these activities will interfere with the route's operability or safety.
- Implement an access route to the Puerto Aguirre waterway terminal and to the frontier post at Arroyo Concepcion (Brazilian border).

All the above (numerals 1 – 7), are the responsibility of the SNC. The following numerals (except as indicated) are the responsibility of the Action Plan for the SEA, subject to the MDSP.

8. Title and Deed Perfection (S&T – Spanish language initials)

- Execute the CAT-SAN process to resolve land title for the all of Chiquitos, German Busch and Angel Sandoval (8.9 Million Hectares) provinces within a period of 4 years. Later, extend this process to the neighboring provinces and municipalities within the AII.
- Carry out the land titling process in the context of appropriate land-use, inter-sector coordination, and institutionalized participation by the social protagonists, that will guarantee the rights of and support small-scale landowners. Offices should be located in each town, activities should be based on a rotational self-financing system, based on appropriate rural and urban municipal zoning.

9. Indigenous Peoples Development Program (Regional IPDP)

- Set up a trust fund supporting the organizational and institutional strengthening of the 6 zone-based indigenous organizations in the area, under the institutional coverage of the Indigenous Fund Agreement. Capitalize the fund with US\$ 2 Million, plus additional costs
- Insure the conclusion of the land-titling processes for all indigenous lands under consideration for the 6 AID municipalities, prior to beginning highway construction.
- Insure the application of set minimum percentages of resources of the Socioeconomic Compensation and Community Development Program, and the Sustainable Development Incentive Program, in favor of indigenous communities.

10. Environmental Conservation and Management

- Declare the following areas adjacent to the highway as Protected Areas: (i) Wetlands and adjacent catchment basins surrounding Laguna Concepcion; (ii) The Serranias de Chiquitos, Chochis and Santiago mountain range; (iii) Tucavaca Valley.
- Take immediate measures to avoid the expiration of the protection granted under the PLUS for the Reserva de Inmovilización Serranias de Santiago and Tucavaca Valley (coinciding with a large part of the areas proposed above) prior to September 2000.
- Zone, draft management plans, provide personnel, infrastructure, resources and effectively implement the management of the PN and ANMI Pantanal de Otuquis, and the San Matias ANMI. The same must be done for the new areas proposed. Strengthen the Kaa-Iya PN and ANMI management.
- Develop participation by Management Committees. Improve the dynamics of the administration of the protected Areas by a decentralized SERNAP district in Santa Cruz (known as desconcentration according to SERNAP terminology).
- Zone the forested areas of the AII according to the categories set forth in the regulations of the Forestry Law, with a priority towards securing large continuous forest areas.
- Support micro-zoning of the conservation areas on private property using the concept and procedure known as POPs (within property zoning for appropriate land-use), in conjunction with the land titling process.
- Implement protective measures for wildlife and promote wildlife management with the communities.
- Carry out environmental education activities.
- Implement financial mechanisms that insure the existence of long-term resources to cover the continuous expenditures for protecting and managing the regional Protected Areas, funds should reside in a regional Conservation Fund within the FUNDESNAP (Fundacion del Sistema Nacional de Areas Protegidas) framework. Capitalize fund with donations from the international community with a minimum of US\$ 15 M.

11. Socioeconomic Compensation and Community Development.

- Compensate the communities and municipalities directly impacted by the highway's construction and operation with the allotment of US\$ 2.4 M as part of the Highway project, these destined to priority social infrastructure projects.
- Compensate the AII municipalities and territories affected by the induced development caused by the construction of the highway by allotting, as part of the Action Plan, the sum of US\$ 2.6 million for priority social infrastructure projects.
- Commitment by the National Government to secure an additional US\$ 5 million as a counterpart for the program, by allotment of funds from the Fondo de Inversion Social (FIS); Fondo de Desarrollo Campesino (FDC), Fondo Nacional de Desarrollo Regional (FNDR), and PROSABAR
- Manage the process to insuring efficiency and results, social participation, project sustainability, integration to regional education and health systems, municipal execution, and the fair distribution of resources among the communities.

12. Sustainable Development Incentive:

- Enable, as a minimum, the program to support the non-mechanized small scale producers, promoting fruit cultivation and handicrafts.
- Foment the Fundacion Trópico Humedo (FTH) so that it will act as the managing unit for the program, and channel resources from the Agricultural Services Program.
- Give priority to proposals to promote the forestry sector.

13. Institutional Strengthening:

- Support institutional training in the agencies that are key for Action Plan Success.

14. Regional System for Social – Environmental Institutional Management

- Efficient operation of the Program's Executing Unit, under the MDSP, and the Coordination and Oversight Committee, (CCS) and Consultation and Participation Committee (CPC).
- Contract the services of a specialized company to act as the Project's Technical Office to provide technical–operative support and speed the implementation of the social–environmental programs. This should be contracted in conjunction with the Environmental Supervision.
- Establish management units and institutional systems by program, with a clear definition of the responsibilities of each of the different public and private protagonists involved.
- Create directive committees for each program, with faculties to deliberate and a balanced government–society composition, to act as the main mechanism of institutional management.
- Institutionalize the system at the municipality level, by strengthening the Surveillance Committee and the creation of a Municipal Committee for Territorial and Environmental Management.
- Establish operating regulations for each program with clear rules for managing processes and resource management.

15. Consultation and Participation

- Validate the Action Plan by a Third Consultation round.
- Develop a group of seminars with local community leaders and representatives to train them to participate in program implementation.
- Implement or activate specific social participation mechanisms in each program, with Program Support, such as Supervision Committees (works), Management Committees (Protected areas), Productive Committees (Agricultural programs), Co-management committees (compensation, relocation), Zoning Committees (Land title issues).

The extent and institutional complexity of the proposed measures make the Socioeconomic Feasibility of the Corridor Project a challenge, since the viability of the program itself is not obvious. The main factors that must be present in order for it to be achieved are:

- Political will, commitment, and coordination by the National government
- Guaranteed resources, by a firm support by the Multilateral Banks and International Cooperation

In March 2000, after reviewing Progress Report Number 1 presented by the consortium, the Bolivian government requested the IADB support to finance part of the Action Plan that will be implemented in the influence area, as a first step towards financing the highway construction. In response to this request, the IADB began to process the Social and Environmental Protection Program in the Santa Cruz Puerto Suarez Corridor (BO-0033), by which it is hoped that the Action Plan programs will be well underway prior to beginning construction work on the highway.

The resources that tentatively would be available for the proposed measures are:

- BO-0033: US\$15 Million from IADB and US\$ 3 Million as National contribution.
- Highway improvement Project; the resources necessary to mitigate and compensate the Corridor's direct impact, (numerals 1 – 7, plus US\$2.4 Million for socioeconomic compensation);
- Donated contribution to the sum of US\$ 15 million to promote long-term environmental conservation;
- Channeling resources from funds and National Programs already in progress;
- Contributions by NGOs and private conservationist entities.

It is not possible, with the information in hand, to make a complete estimate of the resource requirements and availability. The costs for the measures are subject to adjustments depending on operative details, and the potential resources also depend on high-level negotiations.

Nonetheless, an effort to make the Corridor Project viable is worthwhile and can be viewed as a win – win situation, because: (i) the Route project will generate large economic development; and (ii) the social and environmental measures represent a significant steps forward and will bring intrinsic benefits to the region. Most of the measures, particularly the more expensive ones, are not related to direct project impacts, but are part of the standard social liabilities that Bolivia must confront in order to manage its natural wealth with the limited financial resources of the country. The highway increases the gravity of problems that have existed for decades and the urgency with which they must be addressed.

For these same reasons, to impede highway construction is not in the public's interest. Without the highway, Santa Cruz will lose (or postpone) an important opportunity for development and insertion into competitive global markets. In addition, there is no guarantee that the fragile ecosystems and vulnerable social sectors will be protected from the threats that exist and which will remain latent in the future without the highway project.

The Corridor Project, local communities and the environment will become “partners” that work together in search of solutions that will benefit all and avoid a situation where everyone loses.

Therefore, the recommendation of the present environmental assessment is to:

1. Complete the creation of proposals for individual programs and establish a concrete framework for agreements and institutional coordination, in order to reduce the natural risks associated to the execution of a complex program.
2. Confirm the commitment of potential resource identified by the SEA study and attract other potential financiers.

The Environmental and Social Protection Action Plan will contribute:

- To secure the property rights of the indigenous people, peasant farmers and small-scale landowners, greatly reducing the risk of social exclusion.
- Improve land-use and reduce conflicts regarding ownership rights and natural resource use, by means of adequate title granting mechanisms and appropriate land-use zoning.

- Improve the population's quality of life, specifically the indigenous peoples, the peasant farmers and the less affluent sectors of urban centers, by improving basic services' infrastructure, and its accessibility.
- Provide and enforce land-use and forest use guidelines in the economic occupancy frontier, thus reducing highway-induced deforestation and protecting sensitive areas and critical habitats.
- Substantially improve the management of protected areas.
- Provide greater incentives and an adequate regulatory framework for sustainable use of natural resource, and
- Improve the capacity to coordinate and manage social–environmental issues, within a system of citizen participation.

The Program's design was based on the IADB's approved strategy for Bolivia and the Government Operative Action Plan for the 1997 – 2002 period, that have as a main objective to combat poverty. The priorities are consistent with three of the four major themes or "pillars": (i) economic growth that generates opportunities, including environmental consideration (Opportunity Pillar); (ii) develop human resources and provide access to basic social services (Equality Pillar); and (iii) improve institutional management and consolidation of reforms (Institutional Pillar).

The proposed activities are oriented towards economic growth and creating opportunities in a sustainable manner, particularly oriented towards small-scale producers, while promoting environmental protection and promoting social equality. Simultaneously, the management mechanisms will help consolidate the reforms by decentralization.

The Corridor Project and the Program will complement the Government's strategy to optimize the exploitation of the natural resources, creating basic infrastructure for national integration and improving Bolivia's physical access to international markets.

The complexity of the proposed Social and Environmental Program and the multiplicity of the national and international participants involved in its implementation dictates that the execution be contracted to a primary consulting firm that coordinates the actions of other consultants contracted for specific tasks. The primary consultant will assume management of the technical and operative aspects of the programs, allowing the governmental agencies to focus on institutional development and policy decisions, without being concerned by the day-by-day management of the project.

The Program's special aspects are:

- Coordinate the activities with the Highway Improvement Project (BO-0036);
- The large number of activities planned for implementation as part of the Programs;
- The design of an institutional scheme to insure coordination and timely implementation of the proposed actions;
- The prominent participation of the civil sector in all phases of the project;
- The coordination of the actions projected and the availability of the economic resources necessary for timely implementation.

2. INFLUENCE AREAS

The Influence Areas are defined according to the Project's impact and the spatial scale of those impacts on the social and environmental environment. The impacts were classified according to the following impact generating factors:

- Acquisition of Areas within the right of way (ROW)
- Highway construction work, including all installations and auxiliary services
- Vehicle traffic on an improved highway
- Improved access provided by the highway, considering all secondary roads and private roads
- Induced development resulting from increased access, including potential synergism with other projects, planned or implemented in the region, such as new colonization, agricultural and lumber companies, and the consequential expansion of the economic occupancy frontier.

Three levels of influence areas were defined, with progressively increased scopes:

- Intervention Area
- Direct Influence Area
- Indirect Influence Area

The **Intervention Area (AI – Spanish Language Initials)** corresponds to the sites where construction will occur, including the right of way (ROW), the borrow pits and landfills, access routes, camps, industrial plants and other installations areas that will be used during the construction phase. Essentially, this is a long, narrow strip of land (approx. 100 M wide and 600 Km long), with certain small areas adjacent to the main strip.

The **Direct Influence Area (AID – Spanish language initials)** are the areas that will be directly impacted by the highway construction and operation. The physical and biotic impacts are considered within a ~ 20 km strip along both sides of the ROW. The socioeconomic aspects are considered for the entire municipal area for each of the six municipalities that are transected by the proposed highway, with a total surface area of 65,180 km² and a population of 86,500 inhabitants.

The **Indirect Influence Area (AII – Spanish language initials)** are those regions that will be affected by indirect impacts caused by the increased accessibility and the induced development generated by the improved highway and its synergy with other projects. A very large AII is justified due to: 1) the existence or proposal for several Protected Areas, 2) the existence of large important ecosystems (Gran Chaco, Chiquitano Forest, Cerrado, Gran Pantanal), 3) large areas land occupied by indigenous peoples, as well as its 4) potentially synergistic interaction with the gas pipeline to Cuiabá, 5) the Paraguay Waterway, and the 6) existing terrestrial route Santa Cruz – San Matias – Cuiabá. The AII was defined as a polygon of about 226,000 km², consisting of 2/3 of the Department of Santa Cruz and 1/5 of the national territory, including 15 municipalities, (some partially) and a total population of 240,000 inhabitants.

3. PUBLIC CONSULTATION

In compliance with the terms of reference, the Consortium devised and executed a program of public consultation with the affected communities, to ensure their informed participation in the process of project preparation.

The Public Consultation was designed to involve the stakeholders present in the Corridor influence area, to achieve internal agreements and consensus among the stakeholders, to assist them articulate their proposals in the context of the design of Action Plan's. In addition, the process provided the consultants with necessary information to complete the socioeconomic and cultural base-line studies.

The first phase of public consultation contemplated 13 workshops, 7 in municipalities and 6 in the Ayoreo, Izoceño – Guarani and Chiquitano indigenous communities. These took place between October 5 and November 13, 1999, with participation by 451 citizens, authorities and representatives of 106 communities.

After the conclusion of the workshops, the first meeting of the Participation and Consultation Committee was held, as well as a consultation and information workshop was held with a variety of civil organizations (November 15 – 16, 1999 respectively).

Several NGOs recommended that it would be necessary to extend the consultation process, hold meetings in the more remote areas and dedicate a greater effort in reaching smaller communities, so that they can better understand the repercussions of the Project and make an informed decision to support the Complete Action Plan rather than rely solely on summarized version. Consequently, the Consortium's work plan was modified to allow: (i) extend the scope of the Second Round, and (ii) Hold a third round of consultations to discuss the conclusions and proposals of the study as a whole.

The extension and amplification of the Second round of consultation implied (i) the preparation and distribution of a document with program proposals, so serve as an instrument for second phase discussions; (ii) organization of workshops in each municipal capital (instead of regional forums as foreseen in the original work plan); (iii) organization of workshops with representatives of each indigenous community, according to their ethnic and regional organizations (more extensive than the regional organization meetings projected in the original Work Plan).

The Consortium accepted the request to accelerate the preparation of the First Draft of the Action Plan and its wide-scale distribution. On December 20, the document was concluded and sent to authorities in the SNC, VMARNDF, and IADB, several government institutions, indigenous organizations and NGOs. The document was widely publicized in the 6 municipalities affected by the highway, reaching the different levels of municipal government, the local media, civil committees, producers organizations, NGOs, OTBs and the great majority of the rural communities. From December 20 to January 5, 225 copies of the document were distributed. Each document included a volume with the reports on the First Phase workshops, so that there would be access to all the opinions expressed during the workshops. In the principal towns of each municipality, there was large-scale radio and television publicity, inviting the population to examine copies of the document left in public locations for those interested in its content.

The second phase of Public Consultation was held from January 24 to February 20, 2000, contemplating eleven 2-day workshops: (i) in the populations of Puerto Quijarro, Puerto Suarez, El Carmen, Robore, San Jose and Pailon, and (ii) with representatives of the indigenous communities associated with the Turubó, Amanecer and German Busch Chiquitano Centers, as well as with representatives of the Ayoreo community, in an event coordinated by CANOB, and with the Izoceño–Guarani, in an event coordinated by CABI. There was also an informal meeting with CIDOB to present the preliminary results of the consultation.

There was nearly 100% participation of all the communities found in the highway influence area (AID), with representatives of 126 communities, with a total of 464 persons attending. However, there were more attending than the attendance records show, since in the Izozog workshop alone, more than 200 people were counted as being present, even though only 112 were registered. Workshops in the indigenous communities had coverage of representatives from 100% of the communities.

The results of the Second Round and the subsequent technical meetings with government authorities, indigenous organizations, and other civil organizations were used to modify the plan, as reflected in Progress Report Number 2.

The Third round will be held based on the Final EIS and Strategic Environmental Assessment (SEA) Report. In the Third Round, the community representatives themselves (chosen in the second round meetings) will promote the discussion of the Action Plan in each community, so as to consolidate the conclusions in municipal workshops and indigenous zones, and a final workshop. It is hoped that several thousand people will participate directly in these discussions.

Annexes 1 and 2 of this Final report widely document the entire Consultation process and its results.

4. ENVIRONMENTAL AND SOCIAL-CULTURAL BASE-LINE STUDIES (Diagnoses)

The Strategic Environmental Assessment provides a base-line study of the present situation of the Project's influence areas as the foundation for identifying the transformations that the construction and operation of the highway will cause in the region. The Consortium systemized the information from multiple sources, complementing these with original studies based on satellite images, field observations and the public consultation process. The result is a comprehensive characterization of the regional reality, and organized knowledge regarding: (i) outstanding aspects of the natural environment, (ii) the main stakeholders and phenomena in the social, economic and cultural environment, and (iii) territorial occupancy and natural resource use.

The diagnosis was organized to focus systematically on the three different scales of impact, using methodological approaches appropriate for each scale. The AII diagnosis presents the region's general panorama, with wide coverage of all the issues relevant to the study. The AID diagnosis focuses in more detail on the social-environmental components that will interact more closely with the Highway Project. Thirdly, the diagnosis of the Intervention Area specifically documents the components that will be affected by the construction phase of the project.

All these elements were incorporated to the Project's Geographic Information System, which allow an integrated and precise view of the regional reality.

AII DIAGNOSIS

The **Physical – Biotic Diagnosis of the AII** presents a characterization of the geology, geomorphology, soils, climate, water resources, vegetation and wildlife. It is organized according to large ecological units within the region and highlights the habitat diversity and the outstanding aspects of each one. Emphasis has been placed on: (i) interrelation among the natural and human factors and processes that determine the present state of the areas; (ii) summarizing the degree of knowledge available; (iii) the relative importance of the environments for conserving biodiversity; and (iv) the state of conservation and endangered species.

Previous studies conducted in the region by different institutions, among them the NKM Museum, provide an important store of basic information to establish the conservation importance of *Chiquitano Dry Forest*, the *Cerrado Savannas*, the *Gran Chaco Forest*, and the *Gran Pantanal*.

The information incorporated in the base-line study provides a systematic framework for: (i) evaluation of the importance of the existing protected areas; (ii) the identification within these reserves of priority areas that should receive strictest protection status; (iii) identification of other areas to be designated as protected areas, in order to ensure adequate protection for the ecosystems found in the AII; (iv) identification of the critical habitats and biological corridors for protection; and (v) identifying priority areas for sustainable forest management, that would permit a reasonable compromise between economic exploitation and conservation in lands that are outside protected areas.

The **Socioeconomic Diagnosis of AII** focuses on the main protagonists, processes and dynamics of territorial occupation, natural resource use, and social interaction among stakeholder groups. The existing statistical base-line data is somewhat outdated, but it was possible to collect information from additional sources and from original field work, in order to develop a representative perspective of the region.

The following are presented in specific sections: (i) population, with descriptions of demographic characteristics and living condition indicators; (ii) dynamics of the regional economy; (iii) basic services and infrastructure; (iv) land-use and occupancy; (v) land tenure; (vi) social and institutional organization.

The report presents a detailed analysis of Chiquitano, Ayoreo and Izocéño-Guarani **indigenous peoples**, including descriptions of their history, social organization, cultural traits, survival strategies during the past historical cycles, productive systems, and territorial use. As well as, detailed characterization of their role in current socioeconomic system, organizational and institutional systems, legal situation of land ownership, and any programs and projects in which the groups are involved. The study diagnosis is essential for: (i) understanding the peculiarities of each people and their vulnerability to development processes, and (ii) identifying the complementary actions necessary to insure minimum conditions for maintaining their ethnic identity and traditional social organization in a future with the highway.

The **regional economy** is approached from several angles: (i) structure and processes that characterize the current economic system; (ii) economic analysis of the principal productive systems; (iii) specific dynamics of the productive systems for each of the social groupings. The last of these approaches is of special importance, since several social stakeholder groups with distinct productive systems co-inhabit the region: small-scale subsistence agriculture (with different levels of sufficiency and integration to local markets), cattle ranching (with several types of social organization, size and productive strategies), and mechanized agriculture (with several forms of social organization, size and productive strategies). Specialized evaluation of each of the social groupings according to that groups insertion in the productive sphere, is one of the main facets of the Strategic Assessment. Each group will react differently to the stimuli, opportunities and threats posed by the presence of the transportation corridor, and there will be important competition among the groups for appropriation of land and economic space. The social focus of the Action Plan is translated into specific measures to protect and support the most vulnerable sectors.

Forest use is particularly important in the region, due to the enormous potential of the Chiquitano Forest. The report dedicates an entire section to this subject, with updated information on the lumber sector that was the base for the formulation of proposals for improving its sustainability. Of special importance, is the reduction of transportation costs that will create, within certain limits, a favorable situation for the lumber industry. The mining sector, although currently operating only in reduced dimensions, does have important potential for future development.

The study of **Land-use** is also organized by ecological region and provides an integrated description of soil characteristics, productive capacity and use limitations, and is presented in the context of the zoning recommendations of the Plan de Uso de Suelos de Santa Cruz (PLUS) and the present actual predominant use. It can be seen, in general, that human occupation (and deforestation) has occurred preferentially in the regions identified by the PLUS as appropriate for agriculture and cattle ranching. Nonetheless, one can observe the tendency to advance into restricted use areas on the frontier areas of human settlement. It is no surprise that the current land-use follows the PLUS, since the plan is only five years old and the zoning recommendations took into consideration well-established development trends allowing for multiple use in areas surrounding established human settlements and transport corridors.

The study of **land-use change** provides an impressive panorama of how deforestation has advanced in the *Agricultural Expansion Zone* in the past two decades, under the impulse of incentives to implant modern export-

oriented agriculture. The deforestation patterns permit differentiation between the different social protagonists and recent studies show that most of the deforestation can be attributed to large-scale agricultural enterprises, moderately large land-clearing due to Mennonite colonists, with relatively low levels of land clearing by traditional colonists and subsistence based agriculture.

One troubling finding was that due to poor weather conditions and a drop in international soybean prices, an important part of previously deforested areas are either fallow or are being converted to cattle production, with economic returns that do not justify the investments made during the speculative euphoria of the initial boom of the early 1990s.

Another worrisome factor is the inadequacy of the PLUS recommendations with regard to the Chiquitano Forest, the majority of which has been zoned for “Forestry Use and Regulated Cattle Production”. The forestry sector and the conservation groups fear that this may lead, in the long run, to the gradual loss of forest cover, negatively impacting both its economic potential as a lumber source and its biological worth. At that time of the elaboration of the PLUS (early 1990s) the conservation importance of the Chiquitano Forest was incipient, and strong political pressure by the cattle producing sector was successful in avoiding the designation of large areas for forest production only. This sector still opposes the designation of lands that restrict the possible future expansion of their economic activity.

After five years, the situation is different: (i) there is national and international recognition of the worth of the Chiquitano Forest; (ii) the Forestry Law and its Regulations have been passed, and these establish categories applicable in this case, such as Land for Permanent Forest Production and Protected Areas; (iii) a new forest management and oversight system has been developed with much more solid technical base. The conditions are right to resolve the problem, and this may lead to the passage of a Supreme Decree on the *Mancha Verde*, a forest sector initiative to reform the current land-use designation.

The **Land Tenure Diagnosis** had as its base a complete survey of INRA files that summarize the claim processes for land titles in the region. Since there has been practically no processing of land-titles in the AII by INRA under the new law, most of the existing land title claims or in process of evaluation were filed under the previous legal framework. In order to be validated or brought to conclusion, each must be reviewed and validated using the criteria of *Economic and Social Function*.

The results illustrate a critical situation, with enormous spatial overlap of alleged ownership rights that were granted over the past 40 years. In the municipality of Pailon, in the middle of the Agricultural Expansion Zone, there were 514 agrarian units registered with a total area twice the actual surface area of the municipality, while in Robore, there is 11% more land in title claims than present in surface area. Nearly 60% of the files could be geo-referenced and integrated into a GIS and the subsequent maps show immense overlapping of polygons of certain specific areas, that are even greater than what the averages indicate. In San Jose and German Busch, the situation is less critical, at least with regard to surface area, but conflicts of overlapping claims in the area near to the proposed highway axis are also important.

The files also show the trend to concentrate the land holdings in a reduced number of landowners. For example, in the Chiquitos province, large landowners with units greater than 2,500 ha, comprise 18% of all families but 64% of the land title demands; in contrast, small land owners and collective units constitute 57% of the families, but only 12% of the land title demands.

These numbers reflect only the land-title claims filed in INRA. There are an important, although unknown, but probably large number of small landowners, both individuals and communities that do not even appear in official statistics.

There are many land title claims that have been clearly “planted” before the extinct CNRA, these typically entail “perfect” 10,000 ha polygons, often times situated in the middle of a forest without any sort of access route. The Tucavaca Valley, an area legitimately defined by PLUS as an Immobilization Reserve, is plagued by this type of title claim, in spite of its temporary status as a reserved area and the inaccessibility of most of the terrain.

It is clear that due to the virtual absence of oversight by the State, some people have over the past decades created a conflict-ridden situation with the intent to seize land for personal gain. This is a dormant problem that will explode with increased access to the area and as property values increase. The INRA Law and the land-titling reforms were designed precisely to resolve these problems. Deed and Title review in the entire AII is an absolute necessity, if the development that will be induced by the highway project is to occur with order and social fairness. The conditions are appropriate for the application of the process established by the INRA law, for all the provinces and municipalities to be declared a CAT-SAN region.

It is important to point out that the only deed certification processes underway are those being organized for Indigenous Peoples and this is being supported due to compensation programs associated with both gas pipelines.

A preliminary effort was made to spatially integrate the various territorial claims and concessions within the regional context, as part of the GIS. Forestry concessions, protected areas, critical habitats (including those established by PLUS as Use Capacity Class VIII), and other smaller areas as urban areas, highway and pipeline right of ways, were identified as lands not available for allocation for agricultural or cattle raising purposes. This total area composes nearly 40% of the total extension of the Chiquitos, G. Busch and Angel Sandoval provinces.

After discounting these areas, the degree of over-demand for lands compared to the actual area available is even more critical. The gravest cases occur in the Chiquitos Province, where the demands total more than 4.0 million hectares and there are only 2.6 million hectares available, producing a deficit of nearly 1.4 million hectares, and an overlap rate of 52%. At the municipal level, the most complicated cases are in Pailon, with an overlap rate of more than 100%, and Robore with a rate of 90%.

This type of situation is even more complex than a simple case of border conflicts between owners and occupants, as it also enters the area of land-use designation, according to the PLUS zoning system, as well as following guidelines established according to the Forestry Law. Consequently, any land-titling process must be carried out within the land-use designation as legally established.

The AII diagnosis also dealt with the resources necessary for implementing the Action Plan. In two senses: (i) the institutions and social organizations that are active in the region, their initiatives, programs and projects (the “social fabric”), and (ii) the financial resources that may be put in motion starting with the programs underway financed by multilateral banks and National Funds (FIS, FDC, FNDR)

AID Base-line Studies (Diagnosis)

The AID diagnosis put the social-environmental components that will interact directly with the highway project under a magnifying glass. In the AII the work scale was 1:250,000 and the maps are presented at 1:750,000 (to permit visualization on a single A0 sheet). In the AID, the work scale was 1:50,000 and most of the maps were printed at 1:100,000, which provides greater detail.

The AID study is based, to a greater degree on information collected in original field work, using surveys, samples, interviews, social overviews, and economic summaries, as well as in the data provided by the resident population during the Public Consultation workshops.

Forest inventories were conducted in the several types of forests that would be penetrated by the highway, and an overview of mammals, birds, reptiles, amphibians, and fish in representative habitats that will be affected by the Project.

The **physical-biotic AID diagnosis** describes the variety of environments (geomorphologic units, watersheds, vegetation types, faunal communities) that are found along the 40 km wide territorial strip associated with the Corridor.

Both the proposed highway and existing railway go through a transitional area between the Chiquitano Forest (north) and the Gran Chaco region (south). On the western terminus is the agricultural expansion area, while Gran Pantanal region is on the eastern border with Brazil. The AID corridor has strong transverse gradients, since the railway and the highway follow the Chiquitana Mountain ranges, sometimes situated to the north sometimes to the south, thereby crossing a large variety of habitats that are relatively close to each other. The highway also crosses several important biological corridors, which are generally forests associated with water courses, establishing connection between protected areas (or highly ecologically valuable areas) found north and south of the route axis.

In the AII diagnosis the universe for analysis was the AII itself and data is summarized by municipality. In the **socioeconomic AID diagnosis**, the universe of analysis is each municipality and data is summarized at the individual rural community level. The characterization includes 6 municipalities, with the nearly 100 rural communities and includes information on public works, education, health, water, transportation access and prevailing productive systems.

The most notorious traits are (i) accentuated dominance of indigenous communities in the central portion of the Corridor axis and (ii) the high degree of poverty and the lack of basic services, especially in the rural areas.

Based on the demands presented by the populations in the Public Consultation workshops, a primary estimate of the social deficit (liability) of the six municipalities, counting only education, health, water and rural roads was approximately US\$ 30 M, which represents US\$ 350 per inhabitant. Although high, it is not out of the dimension established by the Project. It is feasible to add a program to the Action Plan, in order to attend the most urgent community needs and contribute to reducing the social liability.

The diagnosis also focused on the value of the farming and cattle raising production (local main productive activity) and the Municipal income. Except for Pailon, whose productive activity generates nearly US\$ 96 M per year, the other municipalities are in an extremely weak productive situation, with figures of about US\$ 6.5 million in San Jose, and US\$ 2 million per year in Robore, El Carmen and Puerto Suarez. The two municipalities along the border with Brazil have more intensive industrial, commercial and service oriented activities, but in the central area, (between San Jose and El Carmen) only lumber activity and public service add income to the local economies.

The municipal income also reflects the region's poverty and the municipal governments' miniscule capacity to face the torrent of social demands. In this case, Pailon does not fall outside the general panorama; all have annual total incomes of between US\$ 500,000 and US\$ 1 M, most of which comes from co-participation in national taxes (Popular Participation Law).

Intervention Area (AI) Diagnosis

The Intervention Area (AI) diagnosis focused on three themes: (i) the environmental situation surrounding the route and the projected borrow pits; (ii) the archaeological patrimony that may be affected by construction, and (iii) the population that will be directly affected by expropriation for creating the right of way.

The analytical instruments used included: (i) geological and geo-technical surveys of the existing environmental liabilities; (ii) an archaeological exploratory survey; (iii) interviews and socioeconomic consultations carried out with the urban and rural populations that will be affected; (iv) aerial videography of the entire route of the projected highway, incorporated as digital images in a GIS. The biotic aspects of the impact analysis were determined using a combination of satellite images and videography, extrapolating the results of the samplings done in the AID study in areas very close to the projected route.

Field studies showed a high number of existing environmental liabilities associated with the existing road, these must be corrected during the construction work (see Environmental Liability Correction Program).

A quick archaeological reconnaissance identified a site near Quimome, and significant potential for cave art in the Chiquitana Mountains. The elements collected permitted the formulation of an Archaeological Investigative, Monitoring and Rescue Program.

The most fundamental aspect of the AI is the identification of how the highway impacts the rural properties and the urban area of Robore. Identification of the degree of impact on the agrarian units and the population was done by participative investigation, using socioeconomic surveys, and meetings in the communities to discuss the Project's impact and the expectations of compensation.

The surveys were concluded with a highly representative sampling of the affected population in the diverse categories of social groupings. Nearly all the 35 communities and collective units, 64% of the individual rural properties and 73% of the 64 urban families affected were surveyed. The results are presented in the section analyzing the impact of the creation of the ROW.

5. LEGAL AND INSTITUTIONAL FRAMEWORK

The study presents an analysis and evaluation of the policy, legal and institutional framework for environment and natural resource management. It focuses on: (i) environmental management; (ii) management of protected areas and conservation; (iii) land title and deed issues; (iv) land-use classification.

The study provides (i) a summary of the institutions in charge of managing these areas, highlighting the attributions, activities in progress and weaknesses/ impediments which may inhibit their actions; (ii) analysis of the legislation and procedures in effect, highlighting the strong points that can be used to the Action Plans advantage and the gaps or overlaps that may hinder its implementation; (iii) conclusions on issues that require additional development or institutional strengthening.

Generally, Bolivia has a modern, advanced legal and institutional framework as a result of the reforms instituted in the past decade, but still faces serious limitations with regard to resources, functional stability and operative capacity to enforce the law.

Some institutions, such as SERNAP, INRA and the Forestry Superintendence have sufficient capacity and resources for implementing a variety of ongoing projects; these institutions are capable of assuming additional tasks proposed in the Action Plan. In other cases, such as the Agrarian Superintendence, there is total imbalance

between the functions that assigned by law and the resources and infrastructure at its disposal. These situations can be more easily resolved by delegating functions to other organisms.

Another serious problem is the incipient status of the decentralization of administrative responsibilities to the prefecture and the municipalities, that has resulted in concurrent competence, in which no one knows who is responsible for what, which is compounded by a lack of operative capacity of these agencies in the field. The system is but a few years old and the country is dealing with multiple priorities and severe budget restrictions. However, among the known limitations, it is possible to gradually achieve improved performance.

The issue of protected areas and conservation was analyzed in greater depth given its implications with regard to the Action Plan's long-term sustainability. The main conclusions are:

- There is an urgent need to identify land relevant for conservation according to the Forestry law regulations.
- The resources currently assigned for protected areas in the AII (Kaa-Iya, Otuquis and San Matias) are much lower than the minimum required to guarantee their protection and management, even considering the new resources to be provided by the GEF-II project.
- Immediate action is needed to keep the protected area status that PLUS granted the Immobilization Reserve of the Santiago Hills and Tucavaca Valley, expiring in September of 2000. Moreover, new protected areas must be created and consolidated to complete regional representation.
- Power for decision-making and administration of Santa Cruz' protected areas must be decentralized from La Paz, but consolidated regionally. We propose the creation of a decentralized district of SERNAP in Santa Cruz.
- In addition to the initial investments necessary for infrastructure, vehicles, and management plans, the effective consolidation of the management of protected areas in the AII requires a long term financial mechanism to cover recurrent expenditures, such as personnel and maintenance. It is evident that these expenses cannot be covered by the national government for the foreseeable future.

6. IMPACT AND MITIGATING MEASURES RELATED TO THE EIS

The study systematically identified the direct impacts that would be caused by the implementation of the Highway Project and its eventual operation. In each case, the impact was quantified and the necessary measures to prevent, control, or mitigate the consequences of that impact are presented, as well as the compensation for the inevitable or residual effects that may occur were determined.

6.1. IMPACT OF CREATING THE ROW

The first impact of creating the ROW will be on land ownership and occupancy. The expropriation process will cause about 5,150 hectares of land that are privately owned or occupied to become converted to public property as a strip destined for use as a road.

The second aspect is the legal insecurity with regard to the ownership of land in the entire highway influence area. The expropriation of the ROW land will require previous resolution of all deed and title uncertainties for the impacted properties, in order to correctly identify the legal rights of the affected population. A preliminary estimate, considers a polygon of approximately 580,000 hectares that encompass all of the affected properties. This area must be subjected to a timely land-title resolution, in order to meet the deadlines to start the construction work.

Area to be expropriated per municipality

Municipality	Length of ROW(km)	Land expropriated (ha)
Pailon	124.5	996.0
San Jose	166.5	1,526.4

Robore	140.5	1,405.0
El Carmen Rivero Torres	72.0	720.0
Puerto Suarez	62.4	499.2
TOTAL	565.9	5,146.6

The highway, like the railway, will pass through the area with the densest human settlement in the region between Santa Cruz and Puerto Suarez. For this same reason, it affects a significant number of agrarian units:

- The 257 individual properties represent 16.5% of the total of 1,570 agrarian units with titles or processes registered in INRA in the Chiquitos and German Busch provinces;
- The 18 indigenous communities affected represent 34% of the total of 53 communities legally recognized registered in both provinces;
- The 11 peasant farm communities (syndicates and cooperatives) affected represent 25% of the total registered in INRA for both provinces.

Components affected by ROW, by agrarian unit category

Agrarian Unit Category	Nº	Pop.	Homes affect.	Surf. Affected		Ponds (hrs.)	Wiring M.
				Ha	%		
Indigenous Communities	18	3,498	13	609.9	11.85	3	15,048
Peasant Farmer Communities	6	1,165	8	129.1	2.51	0	0
Syndicates	2	---	0	39.0	0.76	35	1,200
Cooperatives	4	>200	12	182.4	3.54	0	10,480
Mennonite colonies	2	3,050	0	188.0	3.65	0	5,800
Community land	3	--	0	131.5	2.56	0	11,159
Public Institutions	2	--	0	149.2	2.90	0	Na
Individual owners	257	Na	9	3,717.5	72.23	251	Approx. 300,000
TOTAL	294		42	5,146.6	100.00	289	352,108

Obs.: In the peasant farmer communities, the El Carmen R.T. and Taperas communities have been excluded, to avoid indicator distortion.

Land Use in Area Affected by ROW, by social category

Agrarian Unit Category	Fallow or Forest	Crops (ha)		Pastures (ha)		Road (ha)	Total Affected
		Annual	Perenn.	Cult.	Nat.		
Indigenous Communities	423.5	--	1.0	118.0	56.0	11.4	609.9
Peasant farm communities	120.6	--	--	5.0	--	3.5	129.1
Syndicates	28.5	--	0.5	6.5	--	3.5	39.0
Cooperatives	132.0	32.0	--	7.5	--	10.9	182.4
Mennonite Colony	2.0	68.5	--	--	--	117.5	188.0
Community land	24.5	--	--	19.5	74.0	13.5	131.5
Public Institutions	116.7	5.0	0.5	--	--	27.0	149.2
Individual Owners	1,661.4	360.0	3.5	745.3	351.8	595.5	3,717.5
Total	2,509.2	465.5	5.5	901.8	481.8	782.8	5,146.6

The 42 rural homesteads affected constitute a relevant impact, not only because of the number of families involved, but also because there will be structural changes to some of the communal nuclei (Pororó, Limoncito). The homes impacted must be replaced using a fair standard, that will be notably better than the majority of the present structures. Only homes of greater worth will be indemnified.

In the majority of the 18 **indigenous communities**, territorial loss is small compared with the total surface area. Values of about 1% predominate, with some communities experiencing with losses of between 3 and 5%. Two cases with a loss of between 10 – 11% (Santiagoma and Santa Ana), and a there is critical case of nearly total loss for the Ayoreo community at El Carmen Rivero Torres, where there is a small, extremely poor, urban settlement. In the last case, EIS recommends a slight adjustment to the route drafted, in order to pass it by. If this weren't possible, it will be necessary to resettle the community.

There are several cases of community members that have individual properties within the communal territory that are informally recognized by their community. In the consultations done during the surveys, it was evident that the community was willing to accept this situation and that the individual affected receive compensation for the improvements made to that property.

Three **peasant farmer communities** suffer territorial losses between 10% and 13% (Ipiás, Motacusito [Robore] and Yacuses), but these are areas actually covered by brush and fallow. Areas under cultivation and pastures that will be affected are very small. There is no loss of ponds or fencing. In addition to the territory, the main impact will be on housing, with a total of 8 households affected. Five of them are found in Yacuses, where the EIS recommends that there be a slight modification of the road to avoid affecting these homes and thereby significantly reducing the impact.

The three agricultural communes in the Taperas region suffer small territorial losses, amounting to 1 and 2% of their total area, but the impact on pastures and fencing is more significant. Two rural syndicates suffer effects on less than 1% of their territory, including cultivated pastures and fenced areas. The 13 de Junio syndicate in Puerto Suarez will lose 179 fruit trees,

In the two cooperatives surveyed, the affected area represents less than 1% of the total land area. However, in the case of the Basilio Cooperative, 12 homes will be affected, thereby causing destruction of the incipient communal nucleus.

In all the cases of collective property (communes, syndicates, cooperatives and colonies) it is important to detail the losses and compensation among partners, since the communal land is divided among them. Nonetheless, only some individuals will be affected and in different (and unknown) proportions, which will be greater than the 1 – 2% of the total land area. Although the leadership councils of the cooperatives have expressed a willingness to manage the matter internally, the Loss Compensation Program must guarantee effective compensation for the people who have really been affected.

Most of the **individual land holdings** will suffer little effects, with between 1 and 2 % of total surface area. However of the 165 landowners surveyed, 22 cases will suffer impacts greater than 10% of the total property area, and nine of these will suffer impacts of more than 25% of the total surface area. These are instances involving of small scale producers with properties smaller than 30, 50 or 100 hectares. In all, 25 units smaller than 30 ha, and 41 smaller than 50 hectares were identified. In the estimation involving all property units, there is an estimate of 72 units smaller than 50 hectares.

All these are high vulnerability cases, in which the impact of the loss of land is higher and there is a need for specific actions for socioeconomic rehabilitation in the remaining property area. A total of 7 seven small properties will be affected in such a way by the ROW, that their productive viability will be seriously compromised.

In these cases, the territorial loss must be compensated with another, equivalent parcel of land nearby. If this is impossible because the surrounding lands are occupied by legally established properties that meet the standards of INRA, then the Project must assign equivalent land in the same geographic region. If the available land is

farther away from the highway or is of inferior quality, then compensation will be made by granting a greater surface area. Only as a last resort will there be monetary compensation.

Compensation will be made according to the following criteria:

- Indigenous and peasant farmer territories must be compensated by land in an adjacent area. For individual property owners, cooperatives, colonies etc., compensation will be in cash, at the price of land without improvements.
- Improvements, such as clearing, stump removal, cultivated pastures, fencing, will be indemnified at replacement cost.
- Community nuclei will have homes and services relocated to retain community integrity and social function.

Another impact is **property segmentation**, that may cause alterations in the productive infrastructure, especially for cattle ranching. Wire fencing will be necessary to avoid accidents where animals roam freely crossing the highway in search of water or forage, thus creating a serious risk of accident. It will be necessary to construct water tanks in certain large extensions of land, so as to avoid the need to herd the animals to one place or another to feed or drink.

The following are mitigating measures for these impacts:

- Install wire fencing on both sides of the ROW, (and compensate lost fencing in the event that this had already been installed)
- Construct water tanks in communities with extensive territory and on the properties where only one of the segmented sides contains a water source.
- Build cattle access ramps (i) from 1 – 3 in each community, depending on the frontage length along the ROW; (ii) for cattle properties segmented by the ROW, there will be a need for approximately 90 passes in the section Paraiso – San Jose, 60 ramps in San Jose – Santiagoma and 60 in the Santiagoma – Puerto Suarez.
- Education for owners and community members, traffic signs warning of cattle ramps.
- As compensation for the multiple impacts, it is proposed that in some communities a small rural market be installed near the highway to avoid irregular and unsafe occupation of the ROW by informal merchants.

Even the properties that have not been segmented will need an access ramp for access to the highway to avoid that the vehicles have to access the highway in steep angles. Taking into consideration the productive units as a group and their distribution along the route, it will be necessary to install one ramp every 2.5 km, approximately.

The ROW will affect a total of 64 **urban homes** of which 56 are in Robore and 8 in Puerto Ibañez. In Robore, the homes will also lose a total of 825 fruit trees that represent a source of income for the affected families. In addition to the homes, empty lots and municipal urban infrastructure will also be affected.

The impact on **Batallon Junin** military facility in Robore is a major problem, since the routing of the ROW practically eliminates the base's viability and there is the fear that the government will choose not to replace the installations. Battalion representatives participated in the consultation workshops in the municipality and have formulated their compensation demands, which are expensive.

The solution for this problem is conflictive for the Municipality since it does not have at its disposal enough land to compensate the affected area. At the same time, the military base is of singular importance, since its personnel constitute a considerable consumer unit. The threat of the eventual removal or reduction in military personnel is highly negative for the incipient local economy.

Technical Documents Available:

- Land tenure map along the ROW (three sheets 1:100,000); map of each affected community.
- Dossier with a synthesis of the impact and mitigating measures applicable for each community.
- Results of the surveys of the affected properties, compensation expectations.

Compensation: Loss Compensation and Socioeconomic Compensation Programs.

6.2. IMPACT ON THE PHYSICAL ENVIRONMENT

Highway construction involves, fundamentally, the removal of a large amount of earth materials from different quarries and borrow pits (according to the quality required), and their deposition in several compacted layers and pavement. It also implies cutting through mountains, crossing rivers, creeks and wetlands. These operations require a large amount of mobilization in terms of machinery and personnel, truck traffic, campsite operations, and auxiliary plants. The main impacts on the physical environment are:

Impact on Soils

- Alterations to quarries and borrow pits
- Induced erosive processes in large areas after removal of vegetation cover
- Risk of rock slides due to de-stabilization of slopes during excavation processes
- Soil compaction in the ROW, traffic routes, and work sites
- Soil contamination by wastes and accidental oil and fuel spills.

Impact on Hydrological Systems

- Changes to drainage system; insufficient drainage, in number or capacity, can generate flood risks upstream, water erosion downstream, and alterations to floodplains.
- Reduction of subsurface water recharge, cuts in water table, impermeabilization of soil surface
- Formation of ponds in lateral borrow pits without adequate drainage
- Changes in river channel during temporary crossings, bank destabilization.

Impact on Water Quality

- Sediment in water systems, if erosion is uncontrolled and banks are not protected.
- Deterioration of water quality, by sediment, wastes and oil and fuel spills
- Accident risk with dangerous cargo, when spills reach water courses.

Impact on Air and Sound Quality

- Dust lifted by vehicle traffic along unpaved sectors
- Vehicle emissions by highway operation
- Noise from machinery, vehicles and worksite operations

Impact prevention and Mitigation:

These impacts can be reasonable prevented or controlled by fulfilling the Environmental Technical Norms of the Environmental Construction Plan - PAC (Spanish language initials), specifically:

- Environmental Management of Campsites, Lodging and Worksite Installations
- Environmental Management of Construction Activities
- Handling and Disposal of Wastes and Dangerous Materials
- Risk Management and Spill Prevention and Control
- Restoration and revegetation of intervened areas.

The fulfillment of norms and monitoring the environmental effects, must be checked systematically by the Project Environmental Supervision.

6.3. IMPACT ON THE BIOTIC ENVIRONMENT

Impacts on Vegetation

- Uprooting along ROW (59% is covered by natural vegetation) and in borrow pits. This will affect 1,600 ha of Chiquitano forest, 1,000 ha of Cerrado and 200 ha of Chaqueño forests, a total of approximately 1.5 million trees
- Border effects on 8 large patches of forest habitat, with extension of between 5 and 75 km (only on one side), for a total of 144 km (25% of the highway)
- Loss of gallery forest along 114 river crossings, affecting 277 hectares; 91 crossings have major drainage structures (for fauna crossings) as part of the project design.
- Forests loss and interruption of existing biological corridors that connect important habitats: Quimome and Tucavaca Rivers, the areas of Santa Ana, El Carmen and Tacuaral.

Impacts on Fauna

- Habitats lost and fragmentation
- Highway barrier effect (interruption of genetic exchange)
- Road killing
- Increase in hunting, fishing and other wildlife use
- Impact on aquatic ecosystems, as a result of sedimentation and eventual spills.

Direct impacts on Critical Habitats and Protected Areas

Critical habitats at risk: Hills (Otuquis), Gallery Forests, Steep Hills (Chochis)

Impacts in Protected Areas, eventual spills in key places can reach:

Quimome River and tributaries	Concepción Lagoon
Tucavaca River and tributaries	Bañados Otuquis
Between Yacuses and P. Suarez	Caceres Lagoon (Gran Pantanal)

Mitigating Measures: Replanting, Restoration of Gallery Forest at the Biological Corridors and Fauna Crossings; Erosion and Spill Control; Adequate Campsite Location; Fulfillment of Conduct Code (fauna protection), Control of Wildlife Use (Conservation and Environmental Management Program). Priority: Protection of Biological Corridors.

These are important impacts, but in a scale much lower than those foreseen for the AII due to Induced Development. Although the construction of the highway should directly affect only about 3,000 hectares of forests, estimates of deforestation due to land-use change vary depending upon to different development scenarios, ranging from 3 million Ha (without the construction of the highway) to 5 million hectares (with the highway but without the Action Plan) and 1.5 million hectares with the highway and the action plan) (See Future Scenarios)

Compensation:

The mitigating measures are essential, but only achieve partial attenuation of the effects on the biotic environment. Compensation Measures are necessary: establish new protected areas and improve environmental management in areas outside of protected areas.

6.4. IMPACTS ON THE SOCIOECONOMIC AND CULTURAL ENVIRONMENT

Economic Impacts

- Temporary job creation. Relevant Positive effect: Demand is about 3,000 laborers, for an estimated male working population of 17,000 persons.
- Economic activation during construction will inject about US\$ 5 M per year into the local economy
- Improvement of certain portions and deterioration of the already existing roadway infrastructure.
- Increased property worth: Generally positive effect, but with negative impact on the more vulnerable populations.
- ROW lost production: about US\$ 236,000 per year, can be made up for in remaining areas.
- Reduced transportation costs: major benefit of the highway project.

Social Impact of Construction Works

- Migration and Temporary Population Flow
- Social Interaction of communities with outside workers
- Community member occupational reorientation
- Increased demand for infrastructure and social services
- Accident risks (for workers, local population and vehicle drivers)
- Public Health risks.

Impacts on Archaeological and Cultural Assets

Eventual archaeological sites in the ROW, destruction of cave art by visitors, illegal commerce of archaeological and/or cultural wealth.

Impact on Circulation and the Urban Network

- Increased vehicle traffic in construction phase
- Improved population mobility, increase in number of private vehicles in circulation
- Passing of the highway or complementary routes within urban nuclei: Robore, Quijarro.
- Community segmentation
- Circulation conflicts in urban areas and adjacent villages
- Induction of new urban development vectors
- Improved access to small towns and cities (recommendation as complementary construction)

Impact on Road Safety

- Risks on Upward Ramps (probable need for third lane)
- Risks in intersections (design improvement recommendation)
- Crossing of urban areas and adjacent villages (signs, educational projects)
- Cattle circulation and animal drawn carts (lateral lane, with cattle passes and wire fencing along the highway)

Mitigating the Impact of the Construction Work: Obedience of Campsite Norms, the Conduct Code and the PAC Norms, Social Impact Inspections, Social Communication.

Compensation: Socioeconomic Compensation Program

7. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (PASA – Spanish Language Initials)

The programs comprising the PASA describe and organize the mitigation and compensation measures, establishing clear implementation procedures. SNC is responsible for their execution.

7.1. LOSS COMPENSATION AND SOCIOECONOMIC REHABILITATION PROGRAM FOR THE AFFECTED POPULATION

The main actions to be taken are:

- Establish criteria (guidelines) for compensating affected parties
- Support the participation of the affected parties. Forming co-management nuclei
- Declaration of the ROW area as a *Necessary Public Utility*
- Create legal regulations for compensation and rehabilitation
- Socioeconomic census of the affected areas and families
- Land titling for all agrarian units affected by the ROW (INRA's responsibility)
- Allotment of lands to communities, as replacement of affected land.
- Adjudication of Urban Property
- Appraisal of land and improvements
- Negotiation and Payment in cash of the convened indemnification
- Construction of houses, improvements and other installations to be replaced for the affected parties.
- Technical support for productive rehabilitation (vulnerable population only).

Robore Urban Resettlement Project

- Acquisition, partitioning and provision of infrastructure for the urban site
- Building homes, extending public services to the new neighborhood
- Social and productive rehabilitation of family households (fruit trees, family basic consumption)

Community Compensation and Rehabilitation Project

- Allotment of land equivalent to that expropriated (eventual indemnification if other alternatives are not feasible)
- Replacement / indemnification of improvements
- Replacement of affected homes, in a basic pattern better than the present one
- Relocation and reordering nucleus (Pororó, Limoncito, Basilio Cooperative)
- Construction of access, plaza and community market
- Construction of community cultural center in legally acknowledged indigenous communities

Individual, Cooperative and Colony Compensation and Rehabilitation Project

- Cash indemnification with self rehabilitation (large landowners)
- Replacement of improvements and conducted rehabilitation in remaining cases (vulnerable cases)
- Resettlement of some displaced small-scale occupants.

Implementation requisites

SNC operative training, supported by Program Technical Office

Secure resources in the highway budget (indemnification value is not subject to financing)

Participation by affected parties in the entire process by Co-management Nuclei

Replacement concluded one month before starting the work in each sector.

7.2. ARCHAEOLOGICAL INVESTIGATION, MONITORING, AND RESCUE PROGRAM

Includes the following activities (to be carried out prior to starting work in each section)

- Detailed archaeological prospecting in the entire ROW, and the borrow pits
- Salvage excavations in sites found around the intervention areas
- Museum and lab work in the collected material. Systemization and results report
- Formulation of a conservation and valorization policy for the archaeological and historical wealth.

7.3. ENVIRONMENTAL CONSTRUCTION PLAN (PAC–Spanish language initials)

The Environmental Construction Plan's goals are: to avoid, minimize, control and mitigate the potential social-environmental impacts associated with Highway Construction and Maintenance, and to insure implementation of applicable environmental legislation. The Plan establishes the guidelines that must be adhered to by the contractors during the construction phase of the project.

Most of the impacts to the physical environment, vegetation, wildlife, and human communities will be localized, both spatially and chronologically. Some impact will be inevitable, but most can be mitigated to acceptable levels by the procedures outlined by the PAC.

Highway construction is a sequential process involving: ROW demarcation, clearing and preparing the land, extracting and transporting materials from the quarries and borrow pits, compacting the soil, making terrain cuts, building bridges and drainage elements, placing gravel or pavement, restoring degraded areas, replanting and campsite demobilization.

Parallel to these measures, a series of other activities must be implemented to ensure sound water management; erosion control, avoidance of landslide, opening access routes, and disposal of generated waste, as well as safety issues regarding campsite operation, machinery, vehicles and auxiliary plants. All the construction activities can have their impact minimized by the norms established in this PAC.

The Environmental Construction Plan (PAC) will be part of the Bid Specifications and their implementation will be mandatory. The Plan includes the following Programs:

- Environmental Management of Campsite, Lodging and Worksite Installations
- Conduct Code and workers' environmental education
- Environmental Management of the Construction and Maintenance Activities
- Handling and Disposal of Wastes and Dangerous Materials
- Risk Management / Spill Prevention and Control
- Occupational Health and Safety.

7.4. RE-VEGETATION PROGRAM

The goals of the Re-vegetation Program are:

- Protect the engineering work from erosive processes
- Conserve the soil and water natural resources
- Minimize the highway's impact on critical habitats
- Provide a roadside area offering increased safety and beauty.

Most of the ROW will be replanted with sown grasses or restored to allow natural regeneration. Grasses will be sown in (i) slopes of the road's embankment; (ii) steep grades in mountainous areas, (iii) strips situated laterally to the ROW, along side the embankment; (iv) borrow pits.

The gallery forests and wetlands associated with the rivers and creeks that are crossed by the highway are also corridors for vertebrate movement from the northern to southern sides of the road. These critical habitats will be **proactively revegetated** using native species. The goal is to restore the woody stratum to provide practically continuous coverage from the natural forests to the bridges and drainage culverts so as to limit the barrier effect. A total of 28 km of highway (279 ha) cross gallery forests and 20 km of wetlands (204 ha).

In the areas surrounding small towns, ornamental and native species will be planted to improve the aesthetics of the highway and reduce the traffic noise. The planting arrangement will be organized according to basic principals of landscape architecture, using solitary trees (landscape frame), tree groups (lookouts), tree lines (highway guides), living fences (highway conduction), groups of bushes and trees, enclosed groups of bushes and trees, and forest groupings. These techniques will improve the functionality of the highway landscape, as well as create ecological connections for isolated bio-types.

The replanting work will be done while highway construction is underway, by local subcontractors, who will be in charge of a nursery and organizing local laborer.

Activities to be carried out:

- Collect reproductive material (seeds, slips, bulbs, etc.) of native species, in addition to conduct an inventory of the zone's vegetation.
- Identification of critical habitats.
- Installation of nurseries
- Growing plants to the sapling stage nurseries
- Preparing the terrain for proactive revegetation.
- Planting bushes and trees
- Sow grass. Total of around 4,500 Ha.
- Soil rehabilitation and natural re-growth in the wetlands (swamps)
- Follow up and monitoring for one year following replanting.

7.5. PROGRAM FOR CORRECTING ENVIRONMENTAL LIABILITIES

Environmental Liability is any environmental problem or impact that hasn't been properly mitigated or remedied following the original intervention. The Program's objective is to restore the existing degraded areas in the present road and its surroundings, which are the result of inadequate maintenance practices, quarry and borrow pit exploitation, in order to avoid environmental damage to the adjacent areas and communities.

The most frequently observed environmental problems identified during field inspections were: abandoned soil quarry areas, road interference with population centers, interference with natural drainage systems, and others of lesser magnitude and importance.

Restoring borrow pits created to construct and maintain the present road is the most difficult issue, since there are several with different problems. In these areas environmental control measures will be applied that are appropriate for construction activities.

Typical Borrow Pits Problems:

- Vegetation degradation
- Pile of unused material
- Superficial stream erosion
- Water accumulation

Main planned activities:

- Revegetation
- Level and protect terrain surface
- Dig "crowning ditches"
- Create drains for accumulated water

In the sectors where the projected highway coincides with the present road, the construction operations will resolve the majority of the route's and shoulders' liabilities, since the entire area will be intensely intervened and essentially re-engineered. The old borrow pits found more than 50 meters from the present roads axis will also be corrected.

The portions of the present road that are farther from the ROW will probably remain as local roads, that will provide access to small population centers and rural properties. For example: (i) 38.5 km sector between El

Tinto and Quimome (road along ridge); (ii) the entire 127 km sector of present road (southbound) between Taperas and Robore, and (iii) part of the 115 km portion between Robore and El Carmen. The liabilities along the road should be resolved during construction or they will become a future maintenance problem inherited by the municipalities or the prefecture. Future problems on the non-improved sectors of the existing road will be reduced since the traffic and the weight of the vehicles will diminish notably.

The extensive portions of the road that will be parallel to the new highway, some 200 to 300 meters from the new road, will be of no use for local transport. These should be restored and revegetated and incorporated into existing properties or they will become focal points for soil erosion.

Actions to resolve existing environmental liabilities will be a part of the activities that the contractors will complete as part of the construction work. The consulting firm contracted for environmental supervision must supervise and enforce the implementation of these responsibilities.

7.6. PROGRAM FOR MANAGING THE TRANSPORTATION OF DANGEROUS CARGO

The program will have as its main objective the establishment of mechanisms for managing this activity, to adjust the norms and training of Bolivian institutions, so as to bring them into compliance with Mercosur agreements. This will include accident prevention and response to eventual emergency situations, so as to ensure that the impact of any future event on the environment and the general population's health and safety will be minimized.

The program will include the following activities:

- Participation by the institutional protagonists involved in the matter;
- Proposal of Specific Regulations for the transportation of dangerous cargo, in complementation with the existing Regulations for Activities with Dangerous Substances;
- Diagnosis of the risks associated with the main cargoes to be transported on the highway system;
- Environmental vulnerability analysis and Prevention Plan;
- Design and Implementation of the Control Program for transporting dangerous cargo;
- Creation of an Emergency Action Plan for response in the case of accidents with dangerous cargo;
- Human Resource training and preparation;
- Design, specifications, yard construction and acquisition of special equipment;
- Implementation of a Prevention Plan and an Emergency Action Plan.

We recommend that the Program be instituted first in a pilot sector, where the efficiency of procedures can be tested and later extended to the entire highway system.

The Program will be based on Bolivian environmental and transportation legislation. The specific complementary norms will be based on international norms and legislation, such as:

- United Nations regulations
- The European Agreement on the transportation of Dangerous Products
- Facilitation Agreement for Transporting Dangerous Products in Mercosur.

The Servicio Nacional de Caminos will be responsible for executing this Program, through its environmental division. Gradually, as the management mechanisms for transportation of Dangerous Cargo are implemented, the responsibility for coordinating this system will be in the Highway Operating sector. In the practical sense, the Technical Office will be the operative branch of the SNC for implementing the Program.

7.7. SOCIAL COMMUNICATION PROGRAM

The Program will adopt a transparency policy with regard to the Project, with the goal of taking proactively approach to make timely and truthful communication to all social sectors. The Program will be implemented during the construction phase and in the first operative year of the Project, with actions differentiated according to the following **target publics**:

1. International Public Opinion
2. National Public Opinion
3. National Scientific Community and NGOs
4. Government Organizations, Regulatory Entities
5. Municipalities directly affected by the Highway route
6. Affected Communities
7. School-age population in the towns close to the highway

Social Communication Instruments

- Mobile Information and Orientation Booths in areas close to construction sites.
- Informative Bulletin on construction progress and implementation of compensation measures
- Municipal office with a system to receive citizen suggestions and complaints
- INTERNET Website updated regularly with technical information and studies
- Participation in radio and television programs, publication of ads and articles in newspapers and magazines
- Pamphlets, videos, technical publications
- Press releases, to support up newspaper publicity regarding the Highway in local press
- Periodic publications in local papers or periodicals with wider circulation
- Creation of Dial-a-Highway, a free phone line to attend to the publics need for problem solving and doubts, receiving complaints and suggestions.
- Expositions in urban and rural schools close to the ROW, distribution of informative material and accelerated teacher training; incentives for extracurricular activities, fostering interest in environmental protection.

Responsibility: SNC Social Communication Sector, supported by the Technical Office

Mechanisms for interaction with the rural population

- Visits to settlements in the Project influence area, meetings, debates, expositions, interviews and new programs divulged in local communications media.
- Meetings with local communities to prepare them for the presence of construction workers, machinery and job-site camp operations. Presentation of the workers' Conduct Code to local authorities and leaders.
- Dialogue with residents, meetings and conferences to keep them informed of the construction and, later, on how to live with the highway.
- Orientation activities in terms of environmental education, traffic safety during the construction and operative phases.

A communications channel must be kept open with the local community during the entire construction process, and the Social Inspectors must participate in the process.

7.8. ENVIRONMENTAL SUPERVISION AND MONITORING SYSTEM

The Environmental Supervision and Monitoring System is the part of the Corridor Project's Regional Social-Environmental Management System in charge of managing the social and environmental aspects related with Highway Construction. The following institutions are also protagonists in this process, with specific functions:

1. **National Government.** Is the sponsor of the Santa Cruz – Puerto Suarez Corridor Project, that includes the Highway Improvement Project, as well as the Corridor’s social and environmental protection programs. It also assumes financial responsibility for the loans with the international financial organizations for both components.
2. **Ministry of Sustainable Development and Planning (MDSP – Spanish language initials).** Is the main executive entity for the Social and Environmental Action Plan, responsible for coordination and mediation between the executive entities for each program on one side, and the National Government, organized civil society and financial organizations on the other. It will act fundamentally through the Projects’ Executive Unit, and is responsible for the Action Plan before the Competent Environmental Authority (VMARNDF).
3. **Project Executive Unit.** The entity for managing the Social and Environmental Action Plan, answering to Ministry of Sustainable Development and Planning. It carries out functions as coordinator and mediation for the MDSP as described above. Its scope of action is the Transportation Corridor’s insertion into the region’s natural and social environment.
4. **National Road Service (Servicio Nacional de Caminos – SNC)** Is the entity executing the Santa Cruz – Puerto Suarez Highway Improvement Project, and as such, responsible for the roadway project before the competent environmental authority.
5. **Vice-minister of Environment, Natural Resources and Forestry Development (VMARNDF–Spanish language initials)** Is the competent environmental authority, with regard to the roadway project as well as the Action Plan. As such, the VNARNDF will issue the Environmental Licenses and be responsible for environmental supervision of the Roadway Project and the Action Plan.
6. **Financing Organisms.** IADB, World Bank and other international cooperation entities. These institutions have specific social and environmental policies for the loans that they grant and negotiate agreements with the debtors that include the fulfillment of certain procedures and social-environmental standards.

Protagonists Directly Involved in Project Construction

1. **Project Supervision.** A multidisciplinary team from SNC responsible for all construction aspects related with the Project. It reports directly to SNC.
2. **Engineering Supervision.** Consulting firm responsible for project engineering, program fulfillment, quality control, contractor operation supervision, approval and measurement of services executed by the Contractors. It will have Direct Operative Authority over the Contractors by the delegation of Supervisory faculties and will report directly to Project Supervision.
3. **Social-Environmental Supervision.** Consulting firm responsible for supervising the social and environmental aspects related to construction. Will provide specialized technical support for Engineering Supervision in the definition of construction methods and protective measures, as well as monitor the Project’s social-environmental impacts. It has no operative authority over the Contractors. It reports to the Corridor Project Executive Unit.
4. **Job Contractors.** Construction companies hired by SNC responsible for doing the construction work. They report, generally, to Project Supervision, and for day to day operative matters, to Engineering Supervision.
5. **Environmental Auditor.** Independent Specialist responsible for certifying the fulfillment of the environmental procedures and standards, including licenses and permits granted by national authorities, as well as those established by the financing organisms. It reports to the Executive Unit and the Financing Organisms.
6. **Ombudsman.** An independent professional responsible for channeling the general publics doubts and complaints regarding the Project to the Project’s management structure. He reports to the Executive Unit and Financing Organisms.
7. **Surveillance Committees.** Representatives from the surrounding communities organized by job sector. They will assist in supervising the impact caused by the Project outside the job site boundaries, and in solving any eventual problems with the communities.

Agile **coordination** mechanisms will be established to facilitate communication between protagonists and stakeholders, consisting of: (i) Environmental Committee, including SNC Supervision, Engineering Supervision and Environmental Supervision; and (ii) Environmental Field Committees, established in each construction sector, will include the Contractors Environmental Officer, the Engineering Inspector and the Social and Environmental Inspectors.

The attached Organizational diagram shows the organization of the Environmental Supervision and Monitoring System.

Scope of the Social–Environmental Supervision Services

Social-Environmental Supervision will verify compliance with the environmental technical norms defined in the Environmental Construction Plan (PAC). These include: construction procedures, installation and operation of campsites, worker conduct standards, environmental activities implemented by the Contractor and subcontractors, the implementation of mitigating measures and all the remaining factors set forth in the PAC. It will monitor all the activities during the construction phase with regard to the following matters:

- Erosion Control Measures
- Measures Protecting Vegetation and Fauna
- Procedures for handling and disposing of solid, sanitary and dangerous wastes
- Air Quality Protection and Noise Control
- Spill Prevention and Control Procedures
- Standard and Specialized Construction Procedures.
- Accidental Discovery of Archaeological Sites or Human Remains
- Rehabilitating Access Routes
- Correcting Environmental Liabilities
- Environmental Restoration of Borrow Pits Areas
- Abandon and Dismantling Job Campsites
- Restoring and Revegetation the Right of Way
- Direct impacts to the communities surrounding the job site, enforcing responsible parties to repair or resolve problems.

The Social-Environmental Supervision team will be made up of:

- 1 Environmental Supervisor, with basic instruction in geotechnical engineering
- 1 Social Supervisor, working 1/2 time, sharing tasks with other programs in the Technical Office.
- 1 Junior engineer for social-environmental supervision
- Environmental inspectors: 2 inspectors for each of the three main sections of the construction project.
- Specialists in water quality, hydrology/hydraulics, revegetation and job planning, for support in specific moments throughout the construction process.

7.9. COMPLEMENTARY WORK PROGRAM

This program encompasses a set of highway related projects, not previously contemplated in the Corridor Project, but that are considered essential for minimum operability, safety and integration within the region. The proposed components are:

- Roadway connection with the Highway to Puerto Aguirre and the border town of Arroyo Concepcion.
- Paving the two-way route in Robore
- Upgrading and gravel on the access routes to the towns of San Jose, Robore and El Carmen.
- Making improvements to access routes to the rural populations closest to the highway.

- Construction of a pass adjacent to the Highway, but within the ROW for herding cattle and animal-drawn carts, in selected portions of the highway.

These measures not only address impact preventive/mitigating issues, but provide solutions to problems that, if not resolved, will become bottlenecks for the Corridor's adequate operation. Therefore, the following is proposed:

- Incorporate the elements mentioned above into the Project.
- Include them in the engineering design review planned to adjust the Project specifications for gravel instead of asphalt pavement.

Incorporate construction cost to the Project's civil construction budget (as a preliminary estimate, the cost of these interventions should be US\$ 9.5 million, that is, 5% of the civil construction work's cost)

Chart – Estimate of the Investment Cost for the Proposed Complementary Work

Component	Description	Cost (US\$)
Connection to Border Town	Build 1 Km gravel road	331,000
Connection to Puerto Aguirre	Improve and asphalt pavement for 2 Km roads and 2 Km urban streets	1,800,000
Paving in Robore	Asphalt pavement for 3.6 Km two-way road	1,040,000
Access to towns (San Jose, Robore and El Carmen)	Design improvement and gravel (6.3 km) roads	1,187,200
Access to nearest rural villages	Improvements to 37.6 Km Access Routes	1,504,000
Parallel cattle paths	1M compacting on a 7 M platform, about 100Km	3,673,500
TOTAL		9,535,700