

SAN JULIAN COLONIZATION AND CONSOLIDATION

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VOLUME I

Note: Economic
Analysis is being
revised in Working
Paper #6 to reflect
IBRD standard
analyses and will
show substantially
better IRR.

EQUIVALENTE MONETARIO
CURRENCY EQUIVALENTS

US\$ 1.00 = \$b. 20.00 (Bolivian Pesos)
\$b. 1.00 = US\$ 0.05

PESOS Y MEDIDAS
WEIGHTS AND MEASURES

Sistema Métrico con excepción de los siguientes
Metric System except as follows

fanega = 1.6 Bushel (35 libras)
quintal = 100 pounds (100 libras)

ABR. IACIONES Y SIGLAS
ABBREVIATIONS AND ACRONYMS

BAB	- Banco Agrícola de Bolivia (Agricultural Bank of Bolivia)
CIAT	- Centro de Investigación Agrícola Tropical (Center for Tropical Agricultural Research)
CIU(UCC)	- Comité de Iglesias Unidas (United Church Committee)
CODECRUZ	- Corporación de Desarrollo de Santa Cruz (Departmental Development Corporation - Santa Cruz)
COTESU	- Corporación Técnica Suiza (Technical Corporation of Switzerland)
ENA	- Empresa Nacional del Arroz (National Rice Company)
FAO	- Food and Agriculture Organization of the United Nations.
FIDES	- Fundación Integral de Desarrollo (Foundation for Integral Development)
GNP	- Gross National Product
GOB	- Government of Bolivia
IBTA	- Instituto Boliviano de Tecnología Agropecuaria (Bolivian Institute of Agriculture Technology)
INC	- Instituto Nacional de Colonización (National Colonization Institute)
MACAG	- Ministerio de Asuntos Campesinos y Agropecuarios (Ministry of Rural Affairs and Agriculture)

- MEC - Ministerio de Educación y Cultura (Ministry of Education and Culture)
- MPSSP - Ministerio de Previsión Social y Salud Pública (Ministry of Social Services and Public Health)
- NADEPA - Nucleos Agrícolas de Producción Asociada (Associated Agriculture Product in Nucleos)
- NUCLEO - Unidad de asentamiento de 5 por 5 kilómetros para 40 familias con 50 hectareas cada una (Unit of settlement measuring 5 x 5 kilometers for 40 families with 50 hectares each)
- SNRA - Servicio Nacional de Reforma Agraria (National Agrarian Reform Service)
- WFP - Programa Mundial para Alimentos (United Nations World Food Program)

BOLIVIA
SAN JULIAN CONSOLIDATION PROJECT

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BOLIVIA

SAN JULIAN SETTLEMENT AND CONSOLIDATION

I. BACKGROUND

A. The National Economy

1.01 After experiencing a relatively high and steady rate of growth of 6%-7% between 1971 and 1977, the growth rate of the Bolivian economy weakened in 1977 to 4.7%. Further weakening occurred in 1978 lowering the growth rate to about 4%. Reduced exports and rising imports resulted in a trade deficit of about \$us.100 million in 1978. Hydrocarbon exports have dropped about 25% since 1974. At the same time inflation has accelerated, increasing from 11% to 12% in 1974 to 1976, to 18% in 1978.

B. Sector Characteristics and Recent Performance Agriculture in the Economy

1.02 The rural population of Bolivia represents approximately 57% of the total population. Agricultural activities provide employment for 63% of the total work force or the economically active population of the country, estimated to number approximately two million in 1976. The work force in agriculture has grown at a rate of about 2% since 1972, compared to an overall rate of growth of 4%.

in 1977, agriculture and livestock contributed 15.5% of GDP. This compares to a contribution of 17.1% in 1973. GDP per capita in 1977 (1970 pesos) was approximately \$us.5.00 for the agricultural

sector compared to the overall GDP per capita of \$us.200 (1970 pesos) converted to U.S. dollars at \$1.00 = \$b. 20.00.

1.03 Agricultural commodities accounted for 9.6% of all exports in 1977. During the period 1974 through 1977 the value of agricultural imports averaged about 80% of that of agriculture exports. Exports exceeded imports each year excepting 1974.

The agriculture sector has been stagnant except for the substantial expansion which occurred in the Oriente (Department of Santa Cruz). Expansion of production of rice, sugar, cotton, maize, and soyabeans in this area has made important contributions to export earnings as well as in reducing imports.

Production Zones

1.04 Bolivia's agricultural sector is diversified. The variety of soils and microclimates of the three main production zones, Altiplano, Valles and Yungas, and Oriente or Lowlands, enables farmers to engage in many different productive activities. In the Altiplano, farmers grow mainly potatoes, quinoa, barley and tubers and raise sheep, llamas, and alpacas and some dairy cattle. In the Valles and Yungas, a number of subtropical crops are grown and there are some livestock activities. In the Oriente, the predominant crops are maize, rice, sugarcane, soyabeans, and cotton, and there are many medium- and large-scale livestock operations. In the Altiplano and Valles, production is still based largely on a subsistence economy,

contrasting sharply with the fast growing commercial agriculture in the Lowlands, which has experienced a rapid increase in production and adaptation of improved technologies. However, agricultural growth in some areas of Beni, Chuquisaca and Tarija Departments has been low, largely due to inadequate infrastructure investments.

Production Trend

1.05 Food Crops. Potatoes are the main staple commodity and it constitutes the main source of cash income for small farmers in the Altiplano and Valles. While yields per hectare increased rapidly due to the introduction of new varieties and fertilizer, total production went up only slowly because the area cultivated decreased in response to stagnant farmgate prices. Maize production increases have been limited by the size of the slowly expanding domestic market. Barley and quinoa are prevalent in the Altiplano, but total cropped area is restricted, due to inadequate technology, low farmgate prices, and a small market.

1.06 Wheat has been for many years one of Bolivia's main imports. Although yields have increased substantially, domestic production meets only one-fourth of consumption. Rice production was stimulated by the Government's rice program, which established favorable prices and improved marketing channels. Bolivia is essentially self-sufficient in rice and has exported small quantities to neighboring

countries. However, a poor crop in 1978-79 may require imports to cover domestic requirements. Export prospects are presently limited due to Bolivia's poor quality; however, with improved quality, export expansion is possible.

1.07 Sugar, cotton, and soyabean production has led the sector's growth in the 1970s. Bolivia has been self-sufficient in sugar since 1963, and has been exporting small amounts. Originally, the sugar industry developed around Santa Cruz, but, later, plantations moved north, creating serious financial problems for the sugar industry as farm-to-mill transport costs increased sharply while producers successfully maintained favorable farmgate prices. While Bolivia has considerable production potential, export prospects are limited owing to its small size quota under the International Sugar Agreement.

1.08 Cotton production has produced mixed results. From 1960 to 1973, output increased from 1,000 to 37,600 tons. During the r years, about 68,000 hectares were planted in the Santa Cruz area. However, marketing and production problems have considerably diminished farmer interest, and, by 1977, the area planted was only 50% of the 1973 level. By contrast, soyabean output rose significantly from 300 tons a decade ago to 17,000 tons in 1976. There are still vast areas suitable for the crop, so that significant potential remains for further expanding production.

The main problems are low level production technology, resulting in low yields, high costs of transport from farms to processing facilities, and lack of adequate storage and drying equipment.

1.09 Present grape production in Bolivia is negligible. It is estimated that the total area planted with grapes is below 500 hectares. Some efforts to increase production and improve product quality have been made with IDA's Agricultural Credit Project (Credit 561-BO). Yet domestic consumption of wine and singani, the national wine distillate, exceeds by far domestic production and has led to considerable imports from Argentina and Chile. Due to low production, local processing plants operate below capacity. Prospects for further production increases are favorable, considering Bolivia's climate and soils, especially in its temperate valleys, but would depend on sizeable investments to expand the cultivated area, with provision for technical assistance, irrigation and appropriate market channels.

1.10 Livestock. Cattle production is concentrated in the Lowlands which support 75% of the national herd. The remaining 25% is distributed in the Altiplano and, to a lesser extent, in the Valles. The herd size is estimated at 3.2 million head and the extraction rate at about 13%. Although production estimates are unreliable, it appears that Bolivia produces some 78,000 tons of beef per year, mainly for the large urban centers and mines, and some 50,000 to 70,000 head (about 10,000 to 14,000 tons of beef)

are smuggled each year into Brazil. Given the low extraction rate and Bolivia's vast natural pastures, there are excellent opportunities for expanding output. Bolivia could export meat to Chile and Perú. However, a policy designed to increase beef exports will require improvements in quality and an increase in credit and technical assistance. Cattle are slaughtered at light weights, and the meat industry itself needs sanitary controls and chilling equipment. Improvements are also needed in the transportation infrastructure and in the processing and marketing system.

1.11 Sheep, alpacas and llama production is an important economic activity in the Altiplano. Recent estimates indicate that there are about 2.2 million llamas, 300,000 alpacas and 7.5 million sheep in the Altiplano. While the Government made no significant effort for many years to develop alpaca and llama wool production, even though it is an important source of foreign exchange earnings, income, and employment for the rural poor, it has now, with Bank assistance, launched a major program to foster the integrated development of this activity. It is expected that, under the Bank project, llama and alpaca wool production would increase substantially.

1.12 Dairy production has been neglected in the past; consequently, milk is not produced in sufficient quantity for the urban population. Most of the fresh milk sold in La Paz is not pasteurized. Processed milk has to be imported. Although dairy production can be a profitable farming enterprise, there is at present a pricing policy that

depresses farmgate prices, which is probably the major constraint to increasing production. Other constraints to the development of dairy farms are deficiencies of technical assistance, credit, and transport facilities.

1.13 Forestry. Forestry products account for about 3% of GDP and almost 12% of total agricultural output. Out of the total forest area, some 26,000 km² is estimated to be under commercial forestry, with a potential volume of 500 million m³ of exportable hardwood. On the timberlands that are presently exploited, the percentage extraction of the total marketable, saw-timber is extremely small. Due to the cost and transportation, only the very largest of the most valuable species are extracted, while the remainder is destroyed in slash-and-burn clearing. Forestry development has been impeded by the absence of a clear cut policy and lack of transportation infrastructure in the principal forest areas. In order to correct the situation, the Government has enacted comprehensive legislation and has established the Forestry Development Center (CDF).

B. Development Policy and Strategy

1.14 The Government of Bolivia has had difficulties in designing a viable agricultural development strategy. Until recently, agriculture was viewed as a social, rather than productive sector, and

Government sought to expand the economy through hydrocarbon and mineral development. The agricultural sector received only little support, and minimum efforts were expended to develop the productive potential and export possibilities or to deal with rural poverty. The political framework was, and still is, unfavorable for rapid agricultural development, one of the main weaknesses being Government's price policy, which keeps food prices artificially low to benefit short-term interests of the urban consumers and the miners. In addition, the overvalued exchange rate and the present tariff system distorts the input/output pricing process.

1.15 Since the late 1950s, the Government has imposed price controls over most agricultural products in response to strong political pressure from the urban population and powerful labor unions, striving to improve the standard of living of their members. Controlled prices were normally below the real market price and negatively affected farmers' incentives to increase output and investments. Adoption of new technologies and application of modern inputs were impaired, productivity stagnated, and the price differential between Bolivia and neighboring countries encouraged considerable smuggling. As a result, the supply of agricultural products dropped and even exacerbated the difference between administered prices and real market prices. This trend was reversed to some extent in 1974 when the Government partially relaxed its price controls

on some commodities allowing prices to move toward their comparable world market levels. Prices of commodities produced in the Lowlands improved more than those produced in the Altiplano and Valles.

1.16 Bolivia's currency is overvalued, thus increasing food imports and limiting agricultural exports. In 1972, the Government set the exchange rate of US\$1 to \$b. 20, where it remains, even though prices in Bolivia have increased faster than those of its major trading partners. Another factor disturbing market forces is the tariff and subsidy system. Export taxes are one of the most important revenue sources for the Government and are therefore high, while import tariffs increase the prices of most agricultural inputs. In addition, the Government, by providing price subsidies, has limited exports of certain commodities, including sugar and coffee, and promoted imports of wheat flour, lard, edible vegetable oils and dairy products.

1.17 In the last few years, however, Government authorities have recognized the importance of the sector and have sought to stimulate agricultural production. The national development plan for 1976 to 1980 emphasizes food production increasing exports, and reduction of rural poverty. So far, however, the Government has failed to transform its overall development objectives into a conducive policy framework with a detailed sector strategy. While increased attention is given to implementing agricultural projects with external assistance, the Government has done little to amend pertinent policies

relating to agriculture which are in fact necessary prerequisites to success of the project.

1.18 Interest rates for agricultural credit vary from 10 to 18%. Commercial banks levy up to 18% on loans to farmers. Middlemen charge up to 10% per month for short-term credit. The Government's policy on interest on agricultural loans calls for 12% in all agricultural development projects and does not differentiate between sizes of farm operations.

Present Government Policy

1.19 The 1976-80 development plan established the following objectives for the agricultural sector: increase the domestic supply of consumables and primary products; increase and diversify exports of agricultural products by increasing the productivity of existing cultivated lands and by opening new lands into production; improvement of marketing circuits so as to reduce costs and increase returns to the producer; increase participation of rural population in economic and social activities through programs of integrated rural development.

1.20 These objectives are to be achieved through the following: the promotion of integrated rural development projects in selected areas with the view of optimizing the use of resources and achieving a better balance between production and internal and external demand; institutional reorganization for better supporting the development

process; organization of input distribution and output marketing to reduce excessive profiteering by intermediaries; price policies, based upon production costs and levels of productivity, which will stimulate development in the agriculture sector while avoiding subsidizing inefficiency; adoption of mechanisms for extending credit in support of priorities of the plan; adoption of fiscal measures for encouraging agricultural efforts.

1.21 Lacking a global definition of agricultural policies, these are defined in an ad-hoc fashion by certain more or less isolated interventions, e.g., the Agrarian Reform and encouragement of population migration from the densely settled Altinlano to the underpopulated Oriente area, price fixing decrees affecting consumer prices and to a lesser extent producer prices; operation of credit institution with special consideration given to encouraging exports (cotton and coffee) on the one hand and import substitution (milk and fruits) on the other. While certain of these interventions have had and continue to have a favorable impact on development, others have been neutral or have had a negative impact. While the Agrarian Reform and stimulus to colonization have encouraged production by the small producer, the operational credit institution lending, chiefly to a larger producer, has failed to provide the support needed by the small farmer. Price fixing has tended to favor the consumer over the producer.

C. Main Development Constraints

1.22 The Government's agricultural development strategy has to overcome a number of constraining factors. Problems exist in the production system and in the social organization of the sector as well as in its marketing system and in institutional services. The main development issues are the imbalances between natural resources and the distribution of Bolivia's population, the low level of resource exploitation, the prevalence of the extended subsistence economy and poverty, the lack of supporting services, and inadequate marketing systems.

Resource Imbalance

1.23 The main development constraint in Bolivia's agricultural sector is the imbalance between its natural resources and the distribution of its rural population. While most of the country's peasants are overcrowded in the Altiplano and the Valles, vast areas in the Oriente, with its fertile soils and a favorable climate, remain sparsely populated. The Altiplano, which accounts for about 42% of the rural population, comprises only 28% of the country's cultivated land and contributes only 18% to the agricultural GDP. High altitude (11,000 to 14,000 feet), a cold, dry, harsh climate, and low soil fertility make agriculture risky and less productive than the Lowlands. Likewise, the Yungas and Valles also have about 42% of the rural population, comprise 38% of Bolivia's

cultivated land, and contribute some 34% to the agricultural GDP. The Lowlands, comprising about 35% of the cultivated land, account for only about 16% of Bolivia's rural population and contribute some 48% to the agricultural GDP. Its natural resources are largely untouched, with only a small part of the total area suitable for cultivation actually in use. In the Beni, livestock production could be increased substantially and the area around Santa Cruz could be developed for rain-fed agriculture. With irrigation, Bolivia's Chaco region could be developed for agriculture. With the development of these areas, Bolivia could become self-sufficient in most agricultural commodities and could export relatively large surpluses.

Inadequate Resource Exploitation

1.24 On most farms throughout Bolivia, land use intensities and productivity are low and could be substantially increased, particularly in the Altiplano. There, agriculture is still based on traditional methods; practically no fertilizer nor graded or certified seeds of improved varieties are used and modern farm machinery is almost non-existent. Although natural resources are limited if compared to the Lowlands, there is still scope for improvements. Increases in yields have been achieved in areas that received adequate levels of technical assistance and credit and constitute examples of possible development. In the Valles there are relatively large

areas of fertile soils and a favorable climate but lack of water during the dry season limits agriculture to one crop per year. Under irrigation, cropping intensity and yields could be increased. Crop production in the Santa Cruz area is carried out extensively. Incremental yields of cotton and sugar, for example, are relatively stagnant, with the total output increase in recent years due exclusively to expansion of the cultivated area. Small-scale farmers in the Oriente, who are the object of the present project, follow a farming system that employs, successively, clearing by slash-and-burn, cultivating by hoe for three years until weedy grasses and forbs prevail, then abandonment for a new cycle on new land. This varies only slightly from mechanized farming in the region where land is cleared of its heavy forest vegetation, farmed mechanically for up to ten years, then with the encroachment of weedy grasses and forbs, abandoned to poor-grade pasture. This constitutes very inefficient use of very productive soil. Much land in the colonization area is not cultivated, due to its inaccessibility, the lack of minimal social services, the lack of knowledge of settler's farming systems, that would permit their developing a permanent, intensive agriculture, and the lack of financial resources to implement such systems. Climate and soil fertility would support intensive production methods and permit higher yields than are presently achieved. Much land in colonization areas is not cultivated since

settlers lack the financial resources for land clearing and production inputs. Supplying these necessary services would decrease man-land pressure on the Altiplano, increase the socioeconomic status of presently poverty-stricken farmers and expand commercial crop production.

Orient Subsistence Economy and Rural Poverty

1.25 A major obstacle to rapid agricultural development and an important social issue is subsistence agriculture, which, it is estimated, involves large parts of Bolivia's rural population. Subsistence farmers have a low cash income, virtually no access to agricultural credit or markets for purchase of agricultural inputs, and little exposure to technological advances. On-farm consumption usually ranges between 30 and 90% of production, depending on distance to sizable markets.

1.26 Living standards and social infrastructure and services in rural areas are totally inadequate: water supply or sewerage facilities are almost unknown, housing standards are far below acceptable levels, and education services are extremely limited. Low life expectancy and high mortality rates among children are also common characteristics of the rural areas.

Supporting Services

1.27 A critical constraint to the modernization of the agricultural sector has been the lack of an efficient agricultural credit

system. This has affected predominantly small farmers but also commercial agriculture in the Oriente. The Agricultural Bank of Bolivia (BAB) established in 1942, is a single most important source of agricultural credit. Although BAB was organized as an institution designed to benefit small farmers, it has gradually arrived at a point where it concentrates on financing medium- to large-size operations. Specifically, by December 1977, small farmers received only 5% of the credit it had to offer. The largest share of BAB's resources has been allocated to the Lowlands, with the Oriente accounting, during the 1973-75 period, for about 87% of all loans, most of them for livestock, sugarcane, cotton, and soya-bean production. BAB now finds itself in a weak financial position, due to the accumulation of loan arrears, excessive operating costs, and, because it cannot attract domestic savings, its complete reliance on public and external financial support.

1.28 Agricultural research and the extension services are largely ineffective. Research has not been concentrated on specific areas nor directed toward urgent problems. While each of the existing research stations does have a principal focus, most stations have spread their research budget over a large number of activities. Research stations receive only limited financial support. By and large, farmers receive only limited support from these stations. The extension service suffers similarly mainly from financial problems.

Budget cuts and limitations of operational funds as well as salary reductions caused restrictions in the services rendered and forced a large number of trained Bolivian personnel to leave the extension service. As a result, the current ratio of extension workers to farmers is extremely high. There are approximately 90 extension workers in the entire country. Coordination between research and extension has generally been weak, mainly because research stations operated, independently while most extension workers were employed by the Ministry of Peasant Affairs and Agriculture (MACA). To correct this situation, the Government created the Bolivian Institute for Agricultural Technology (IBTA) in 1975, which now coordinates most research and extension in the country. IDB is presently processing a proposed \$us6 million loan to expand and upgrade IBTA's operations. For the Santa Cruz area research is the responsibility of CIAT. CIAT was created in 1975 to provide research and extension services in the Santa Cruz area. While in theory a branch or entity of IBTA, in practice CIAT operates independently to a large extent. In the Santa Cruz area, extension by private groups--mostly church related groups--account for most of the effective extension groups.

Marketing

1.29 Serious marketing problems are concentrated in three areas --quality of exports, transportation to foreign and domestic markets,

and communications. In addition, the Government has not yet been able to design a marketing strategy for potential export products. Insufficient transportation and storage infrastructure in Bolivia makes product exchange difficult and expensive and prevents regional specialization. The main agricultural production areas are still largely isolated and produce predominantly for their own consumption. Finally, an inadequate communication network has impeded the flow of price and other marketing information to farmers.

D. Factors Limiting the Productivity of Settlers
in the Lowlands

The System of Farming

1.30 The slash-and-burn is the principal farming technology employed by the settlers, at least in the early stages of settlement. This involves the clearing of forest for crop production with abandonment of areas to second growth monte (barbecho, second-growth bush, and invading species) after three to four years of cultivation. Second-growth monte is returned to cultivation after varying periods, usually a function of farm size.

1.31 In terms of maintaining soil fertility and least damage to the environment, this technology is effective, so long as the "fallow-period" is long enough. Otherwise, soil fertility decreases and probably most importantly weeds, which are difficult to control

with slash-and-burn technology, take over. Under these circumstances the land is usually abandoned to extensive livestock production frequently by sale to larger farmers.

1.32 In terms of efficient use of resources, slash-and-burn technology even if practised optimally, is very inefficient. The very heavy labor requirement for clearing land before each succession of crops and the year-to-year control of weeds between successive plantings in cleared areas so severely limits the land area that a family can cultivate that little over bare subsistence can be obtained. Moreover, this system results in rapid destruction of forest at a great loss to potential production,

The Lack of Capital

1.33 The limited if not in fact absolute lack of any capital by colonists immediately condemns them to the slash-and-burn technology. At the same time, the low productivity of the technology virtually precludes the production of surplus commodities, the proceeds of which could be reinvested in improvement of the farm as a resource or in the improvement of production technology.

The Lack of a Technology Intermediate between Slash-and Burn and Modern Mechanization

1.34 Production technology in the Oriente is usually based on slash-and-burn or on some form of mechanization, frequently on a large scale. There are limited examples of intermediate technologies which the slash-and-burn farmer could gradually adopt as his limited access to capital improves. These examples are usually to be found in the immigrant

settlements. There by virtue of greater access to capital and greater technical knowledge, the settlers have been able to move rapidly from slash-and-burn technology to a more permanent system of rotational agriculture with a high degree of integration of livestock in their farming systems.

1.35 A system of rotational agriculture with or without the integration of livestock requires weed control technology, rotations or crop sequences which reduce soil deterioration and contribute to maintenance of soil fertility, and water conservation. Weed control is probably the most critical factor in establishing permanent, efficient agriculture. The technology currently used relies almost entirely on frequent cultivation. This approach is not open to new colonists who lack the capital for either the more complete clearing of land (destumping) or for acquiring the agricultural implements and power sources (animals or tractors) required.

Marketing

1.36 Limited marketing opportunity is also an important obstacle to the achievement of greater production and improved well-being of the small farmer colonist. Inadequate transportation is one of the most serious factors limiting marketing. However, other factors-organizational capability, limited market and price information and storage also play a role.

E. Development Policies and Strategy

General Approach

1.37 Bolivia's natural and human resources are entirely adequate to supply nearly all agricultural commodities required for domestic consumption and to produce considerable surpluses for export, including sugar, cotton, timber, livestock products and certain tropical or tropically oriented commodities of high unit value which are in world short supply, including cacao, hot peppers (*capsicum frutescens*) and ginger.

To realize this potential would require the establishment of appropriate supporting policies and a development strategy which would liberalize or remove price controls and excessive taxes on agricultural commodities and production inputs, establish a realistic exchange rate and strengthen the essential supporting institutions.

1.38 The Government's strategy for the Lowlands should take into account that they consist of extremely productive soils covered by increasingly scarce and valuable hardwood forests. It seems that a responsible Government strategy would provide for the rational, conservative exploitation of the Lowlands as a means of improving the socioeconomic lot of the present small-scale farmers of the Altiplano and the Upper Valles while increasing the national supply of food and foreign exchange earnings. Such a strategy would attempt to reduce the waste of timber by establishing permanent

farming systems and, taking into account the remoteness of the region from its markets, emphasizing the production of high unit-value crops which do not compete with highly efficient, mechanized farming systems in the developed world.

Settlement

1.39 Migration from the overcrowded Altiplano and Upper Valles to the Lowlands will be the most important factor in expanding the agricultural frontier and balancing regional discrepancies in population distribution and socioeconomic status. That there has already been considerable rural migration is evidenced by the fact that, in 1977, some 230,000 people were living in rural settlement schemes, accounting for more than 5% of the Bolivian population. Spontaneous settlers account for 68% of all migrants and occupy 40% of all colonized lands. The remaining areas are used for directed or oriented settlements schemes receiving Government assistance. Generally, resettlement schemes have been successful where conditions have been conducive to developing viable farming systems and where markets are accessible. The trend in settlement schemes indicates that there is a natural adjustment process taking place and that if conditions are favorable the excess population in the Altiplano and the Upper Valles will shift to the Lowlands. The value of the colonization process to agricultural development in Bolivia can be seen in the fact that settlement schemes account for 30% of the national sugar production and 85% of the total rice production.

1.40 The experience of the National Colonization Institute (INC) with organized settlements has not always been encouraging since many such schemes did not reach the envisioned production targets and the number of settlers leaving the project area has been relatively high. The spontaneous colonization process for settling the tropical frontier has proved more flexible for responding to economic opportunities than government-directed colonization projects. However, spontaneous settlers usually fail to establish stable systems of agriculture production and cause serious environmental damage. Since spontaneous settlers do not always receive legal titles for their plots and there is no production support or social infrastructure, they tend to abandon their plots with the encroachment of weeds. INC estimates that about 120,000 hectares are destroyed annually by spontaneous migrants with slash-and-burn cultivating methods.

1.41 Promoting migration from the Altiplano and the Upper Valles to the Lowlands clearly should be an important element of Government policy and of the strategy of external financial institutions which are supporting Bolivia's economic development efforts.

The lack of a clear policy framework within which to formulate colonization planning and strategy imposes a serious handicap on external donor efforts to pursue a rational approach.

The present project proposal seeks to resolve at least one of the serious problems which has emerged from over a quarter of a century of colonization experience, namely, that of insuring stability and a

measure of permanence in the established settlements whether they be spontaneous, directed or semi-directed. This aspect of colonization has not received adequate attention to date. Rather, colonists have been left on their own with virtually no support in the way of technical, health and education services.

1.42 Focusing in particular on providing technical services to the colonist, the present project should develop a model for consolidation efforts elsewhere, as well as a training ground for local personnel.

Institutional Strengthening

1.43 The principal institution involved with the colonization program is the INC. This institution, lacking a sound statutory base has had difficulties in defining its role as well as the limits of its responsibilities. As a consequence it has engaged in a wide variety of activities without adequate resources of personnel or finances. Many of these activities overlap those of other institutions. The result is a dilution of efforts by INC and poor performance. A clear definition of the role of INC and its relationship to other entities is long overdue.

1.44 The institutional capacity to provide technical service to colonist is extremely weak. In the Santa Cruz area this responsibility rests on CIAT. The effectiveness of CIAT has been limited largely by financial resources. When CIAT was created in 1975 it

was projected that important financial support would be forthcoming from private and semi-private organizations to supplement those from the Departmental Development Corporation and the national budget, through the Ministry of Agriculture. Not only did anticipated resources from private and semi-private entities not materialize, but the national budget resources have not only not grown as expected but have been irregularly available. The Departmental Development Corporation contributions have also failed to grow as expected. A major element of the proposed project is that of providing financial support to CIAT so that the technical services in extension and research can be expanded to a reasonable level.

1.45 Little to no credit has been available to the colonist. The BAB approach to extending credit is to depend on the farmer to develop his own plans and credit requirement and application which are received only at the Bank's agencies. This practically forecloses accessibility of the small farmer to credit. An important aspect of the present project is to develop a credit delivery system which takes the credit to the farmer. The system is based upon intimate collaboration of technical services and lending personnel.

F. THE COLONIZATION PROGRAM

Historical Review

1.46 One of the principal goals of the Bolivian government policy in recent years is the colonization and development of the Oriente. The settlement of the Oriente is viewed as a means for (1) increasing national production, especially of food commodities, (2) absorbing population from the densely populated Altiplano and Upper Valley and (3) integrating the lowlands into the national economy.

1.47 With the improvement of major roads during and following the Chaco war in the 1930s, spontaneous movement of people began from the Highlands to the Lowlands to the east, north and northwest of the highland areas. Beginning in the mid-50s, special efforts were made to encourage settlement in the Lowlands, and a series of government directed, semidirected colonization and controlled spontaneous settlements were undertaken.

1.48 By 1978, some 51,000 families representing a population of about 190,000 had been settled in seventeen controlled settlement areas. An additional 11,000 families had settled in uncontrolled settlement areas. Although more recent, the largest number of settlements (11) are in the Santa Cruz area and involve about 21,300 families and 90,000 individuals or almost half of the total controlled settlement. Table 1 provides data on colonization activity in Bolivia as of 1977. Table 2 shows comparative data on the several colonization projects.

TABLE 1
 STATISTICAL SUMMARY OF COLONIZATION IN BOLIVIA⁵
 1,977

AREAS OF COLONIZATION	TYPE	No. OF FAMILIES	SIZE OF CONCESSION (Hectares)	POPULATION
Alto Beni Region				
Caranavi	Spontaneous	14,372	144,707	57,480
Alto Beni	Gov. Directed	4,565	- 66,032	18,262
Chapare Region				
Chapare	Spontaneous	7,812	122,051	31,266
Chimore	Gov. Directed	1,816	- 6,120	7,224
Santa Cruz Region				
Yapacani	Spontaneous	2,518	79,580	10,076
Yapacani	Gov. Directed	1,986	99,300	7,944
Buen Retiro	Gov. Directed	794	39,700	3,176
San Pedro - Chane	Semi-directed	8,887	268,690	35,548
Cotoca	Gov. Directed	53	7,650	212
Robore	Spontaneous	2,369	84,950	10,216
Cordillera	Spontaneous	2,689	140,850	10,516
San Julian	Semi-directed	581	29,059	2,324
Mennonites	Foreign	339	44,838	2,954
Okinawans	Foreign	714	81,872	4,714
Japanese	Foreign	371	35,288	1,451
Other Regions				
Casarabe-San Borja	Spontaneous	860	13,940	3,440
Taraji	Spontaneous	674	13,480	2,696
Uncontrolled Areas	Spontaneous	11,000	110,000	40,000
T O T A L S		62,000	1,418,108	230,105

TABLE II

54

COMPARISON OF DIFFERENT FORMS OF COLONIZATION

	Average Farm Size (Hectares)	Average Land in Cultivation (Hectares)	Percent Abandoning Colony (Percent)	Average Annual Income (Dollars)	Average Income per Hectare Land Cultivated (Dollars)
<u>Foreign</u>					
Okinawan	50	22	5	2,960.00	134.50
Japanese	50	18	6	2,280.00	126.60
Mennonites	40	16	2	1,975.00	122.20
<u>Spontaneous</u>					
Chapare	10	6	16	660.00	110.00
Caranavi	8	4	12	310.00	77.50
<u>Directed</u>					
Alto Beni	20	4	52	310.00	77.50
Chimore	20	7	46	405.00	58.00
Yapacani	30	6	32	330.00	55.00
<u>Semi-Directed</u>					
Chane-Piray	30	12	8	1,026.00	85.50

1.49 The colonization program has made little contribution to the government objective of relieving population pressures in the Highlands. The migration of approximately half a million people to the Lowlands as settlers and as laborers and urban settlers has absorbed only a small portion of the population growth in the Highlands in recent years.

1.50 Settlement in the Lowland has however had a significant impact on agricultural production and especially the production of food commodities. Among the food crops which have been produced in significant quantities are rice, maize, bananas, manioc and citrus. These, and especially rice, are becoming staples in the diet of the highland population, replacing in part the traditional staples of wheat and potatoes.

1.51 Agricultural imports have decreased as rice and maize production have each increased about six-fold, and sugar 30-fold in the past 20 years, approximately, while cotton production exceeds domestic consumption. These four commodities are produced largely in the Santa Cruz area.

1.52 The colonization together with improvement of roads has had an important impact on integration of the Lowlands in the national economy. Whereas earlier, much of the trade from the Lowlands was oriented toward bordering countries, it is now oriented internally, increasing the economic ties between the Lowlands and the Highlands.

1.53 There is a substantial disparity among agricultural enterprises in the Oriente. The colonists, for the most part, have improved their lot only marginally from conditions obtaining in the Highlands.

Important exceptions are to be found in the immigrant colonies (paragraph 1.48). Many factors have contributed to the low level of economic achievement: land holdings too small for slash-and-burn technology, poor quality of roads and transport services, inadequate market structures, high costs and limited availability of production inputs and lack of a proven alternative to the slash-and-burn technology adaptable to the small farmer.

1.54 In contrast to the above are the large-scale mechanized sugar, cotton and livestock enterprises of commercial farmers and agro-corporations in the Santa Cruz area. Government investment in physical infrastructure and in agro-industrial plants has fostered this type of development more so than that of the small farmer. This development has occurred to a greater extent in the drier areas to the east and south of Santa Cruz and north toward Mineros. The colonization activity on the other hand has been directed chiefly to the North and Northwest. These areas have greater amounts of rainfall and are covered by a heavier tropical forest, resulting in more difficult land clearing and greater difficulty in maintaining roads.

1.55 The larger farmers and agro-industrial corporations have profited more from government investment than have the smaller farmer-

settlers. They have also made a substantially larger contribution to the national economy. The potential for improving the lot of the small farmers depends largely upon increasing investment in infrastructure, especially, transportation and marketing, and increasing technical support, including research and extension in the development of an intermediate technology and production systems between slash-and-burn and the highly mechanized large-scale production systems.

1.56 The lack of an alternative to slash-and-burn technology for the small farmer is having an important impact on the environment. The forest cover is rapidly disappearing, and in the older colonies where holdings were small, not only has the forest disappeared but crop production as well has given way to low value grasslands for animal production. There is virtually no evidence of the establishment of a sustained crop production system in the settlement areas other than among the immigrant colonies and among the colonists who have access to sugar mills and are producing sugar cane. Given that these land areas represent some of the most fertile soils in Bolivia, the rapid conversion of the tropical forest to grasslands would appear to be making poor use of soil resources, whereas, large areas of the country can produce cattle, fertile soils capable of sustaining profitable crop production, intensified livestock integrated with crop production and forestry are less abundant.

Recent Colonization and Emerging Problems

1.57 The San Julian project is the largest settlement activity undertaken by the Government. This project together with the construction of certain infrastructure in the Chané-Pirai settlement area, and older area which was spontaneously settled, is being financed by an AID loan-grant of \$9.8 million.

1.58 The San Julian project is classified as a semi-directed settlement undertaking, as distinguished from the spontaneous settlement with no direction from government and the directed settlement projects, which were highly structured and directed and frequently highly paternalistic.

1.59 The San Julián project was designed to avoid many of the problems of the earlier directed projects and the spontaneous settlements. With respect to the latter, the principal improvements consisted of providing certain basic infrastructure, roads, potable water; a more adequate land area (50 hectares) than has been generally the case with spontaneous settlement (about 10 hectares); the provision of technical services - an orientation program of some four months to provide social and technical orientation to the tasks ahead of settlers and to permit their establishment in communities, and the clearing of the first lands to be cultivated before the beginning of the agricultural cycle corresponding to the rainfall cycle.

1.60 With respect to the directed settlement approach which had characterized many of the earlier settlements, the San Julian project provided a substantial latitude of freedom of choice to the settlers. The only essentially structured elements of the project were the spatial arrangement of land holding with respect to chosen village sites and primary and lateral roads and the orientation program lasting three to four months. The colonists had freedom of choice with respect to (1) design of village layout-restricted only by spatial arrangement- (2) village organization and work organization for land clearing, crops and cropping systems, (3) organization for providing consumer goods, (4) methods of marketing and (5) establishment of private and/or cooperative small processing plants. Settlers were provided with complete rations for nine months - until the first harvest - through the World Food Program and externally financed purchase of locally available foods. Aside from food for the first nine months, the use of chain saws for clearing large trees and plants and seed, the project provided no other material support to the colonists. The settlers built their own shelter, schools and cooperative structures.

1.61 The infrastructure provided by the project included a main, all-weather road, lateral access roads, a water well for each village or nucleo (a group of 40 families), and an agriculture service center for the entire project.

1.62 Among the differences from the directed and the spontaneous approaches, five stand out as probably the more significant in terms of having greatest utility to the settlers, of providing stability to the settlement and contributing to the low rate of abandonment by colonists. These are: (1) provision of potable water, (2) the orientation program with provision of time for the settlers to construct dwellings and clear land for the first crop before the beginning of the next cropping season, (3) certain minimal health care during the orientation period, (4) the high latitude of freedom of choice given to the settlers with respect to most of the activities which they undertake and (5) provision of food rations during the first nine months.

1.63 In other respects, however, the settlers at San Julian faced many of the same problems of other settlers. Difficulties in marketing surplus products due especially to delays in construction of the main road and to difficulties of crossing the Rio Grande. High transportation cost resulting therefrom, has been not only a serious impediment to profitable marketing of surplus produce, but also results in higher costs for consumables and production inputs. In spite of the provision for an agricultural service center to provide technical support for the settlers, the actual rendering of technical services has been minimal. In large measure this has been due to delays in the construction of facilities and in establishing a pattern for technical services, but also to the limited number of technical personnel made

available for this purpose. A very significant weakness of the technical support program is the limited research base for defining production systems to replace the slash-and-burn technology, to enable the farm to manage weeds effectively and to increase labor productivity.

1.64 Access to credit by most settlers has been extremely limited or not at all. While at this early period of settlement, during which the farmers' concerns are chiefly those of getting established and producing sufficiently for subsistence, the lack of credit is not seen as a serious problem. As the settler begins to move into a more commercially oriented production the availability of credit for both short-term production loans and for medium-to-long-term capitalization loans will become increasingly important.

II. THE PROJECT AREA

A. Physical Features

2.01 The area of the proposed project lies between the Rio Grande on the west and the San Julian River on the east. The railroad joining Santa Cruz with the Brazilian frontier marks the southern limits. Tropical rain forest some 180 kms. to the north of the railroad marks the northern boundary.

2.02 The project area consists of two discrete parcels, one which is settled (settlement began in about 1970 and will be completed in 1983) and a second parcel which is to be settled as soon as minimal road infrastructure is provided, approximately 1983 to 1987.

2.03 The first area of direct impact of the project known as San Julian North consists of some 2,500 km² to the north of the Puerto Banegas - San Ramon road (commonly referred to as the German Road). The settlement area extends 100 km. south to north and 15 to 25 km. east to west. The area is traversed in part by the Pto. Banegas-San Ramon road at the south end and by an all-weather road

(still under construction but due to be completed in 1980) running north-westerly from the Pto. Banegas - San Ramon road. This area is approximately 75 percent settled. When settlement is completed some 2,400 families will have been settled, each on 50 hectare plots, organized into 60 village centers. Some farm units, settled spontaneously, are interspersed with and/or lie along the organized settled area, will also be influenced by the project. Likewise, adjacent lands on either side between the colonized area and the San Julian river on the east - ranging in width from 15 to 30 km., which may be opened to colonization by extension of lateral access roads, would also benefit from the project.

2.04 Taking into account the potential continuing settlement in the area, some spontaneous settlement and existing private farms and ranches, it is estimated that by 1982 there will be some 3,000 colonists on 50 hectare plots, 200 settlements of plots ranging from 50 to 500 hectares and 160 with more than 500 hectare holdings, approximately.

2.05 Access to the project area is seriously restricted by the Rio Grande over which there is no bridge. Without

a bridge to service the project its successful implementation would not be economically in feasible.

2.06 The ecology of this area changes in a south-to-north direction of from that of a relatively dry, subtropical setting with a relatively low forest consisting principally of low-growing leguminous species at the southern end to a high, humid, tropical forest at the northern end. Annual rainfall ranges from approximately 900 mm. at the southern end to 1,900 mm. at the northern end. Most of the rainfall (70 to 80 percent) comes during the summer months, November through April. Winter rains occur, being more common and heavier in the northern parts. June, July and August are the driest months. Soils are aluvial deposits mostly of Class I and II (U.S. Comprehensive Classification System).

2.07 The average mean monthly temperature at the General Saavedra Experiment Station which is parallel to the project area is 18.8°C in July and 25.4°C in January. While the area is usually frost-free, an occasional frost increases the risk factor in producing purely tropical crops south of Nucleo 38 (ANNEX 3).

2.08 Rice and maize are the principal crops produced in the area. A wide variety of fruits and vegetables are also produced, mostly for local consumption. Only limited livestock enterprises have developed so far. The area appears to be suited for a wider range of commercial crops, e.g. soybeans, sugar cane, cotton, perhaps also wheat; a wide range of livestock enterprises; as well as tropical and subtropical fruit and vegetable. Limited infrastructure and limited demonstrated production technology and systems have limited production to the basic subsistence crops utilizing a slash and burn technology.

2.09 The second project area (San Julian South) extends southward from the Pto. Banegas - St. Ramon road parallel to the Rio Grande toward the Santa Cruz - Corumba (Brazil) railroad. This area is largely unsettled and devoid of roads except for limited trails.

2.10 The ecological setting is similar to the southernmost reaches of the San Julian North area, with precipitation decreasing in the southerly direction. The vegetation grades increasingly toward a low forest dominated by leguminous species (mesquite). Annual precipitation ranges

from 900 - 1000 mm. in the north to 800 - 900 in the southern most parts. Most of the rainfall occurs during the summer months, November to March. Winter rains are very limited.

2.11 The area is similar to extensive areas lying on the western side of the Rio Grande which are now cultivated in cotton, sugar cane, maize corn and, more recently, soybeans. The area is apparently suited to these crops as well as others such as peanuts, cassava, wheat and wide variety of fruits, vegetables and livestock.

B. Population Characteristics

2.12 The project area known as San Julian North is presently populated by approximately 1800 families of predominantly Quechua and Aymara ethnic groups. "Mestizos" and Lowlanders make up a small but significant percentage of the population. The area known as San Julian South is uninhabited, although it will likely be settled by people with socio-cultural backgrounds similar to those in San Julian North.

2.13 Typically, young men come from the Highlands and Upper Valles as migrant laborers on the larger commercial

farms in the Santa Cruz - Montero area, where they learn of the colonization program.

2.14 Typically the settlers are young with small young families. Surveys indicate that all of the adult males and 37% of the females speak Spanish. Aymara and Quechua are the languages of the homes. 50% of the population over five years old appraise themselves as being literate in Spanish.

2.15 It is difficult to assess the per capita income of the group at the present, due to the lost or deferred income returned in resettlement. They leave a population whose per capita annual income is less than \$100. The first year of settlement they realize little or no income. Following the first year, due to the limited area of land that they can cultivate, and due to the remoteness of markets, their income is largely in the form of subsistence food crops. As time passes and they become better adapted they increase cash crop production as they are able, particularly rice and maize.

2.16 The settlers would be classified as "early adopters", as demonstrated by their decision to break ties

with their traditional social systems. Further, their cultural heterogeneity tends to foster change. They readily form new systems, establishing new norms based on mutually accepted tradition (particularly religious beliefs) to address contemporary circumstances.

C. Land Leaseure and Utilization

2.17 The process of land acquisition begins with the assignment of a colonization project area to the Institute of Colonization (INC) for reassignment to settlers. In the case of San Julian North, the settlement land, 250,000 hectares, is divided into 2,000 hectare blocks, separated by 500 meter forest green belts. These blocks are subdivided into 50-hectare parcels. (Annex 10).

Upon arrival at the project site the applicants enter a four-month orientation program, at the end of which they are given a Settlement Certificate by the orientation officers. They are promised deeds of title to the land after two years' exploitation.

2.19 Four problems with the system have emerged:
(1) There have arisen conflicting claims for some of the

settlement land, merely by outside persons presenting apparently valid deeds of title and demanding possession.

(2) It is not clear that any of the colonists, some settled as long as ten years, have received deeds of title to the parcels they occupy.

(3) There has not been a detailed land use potentials survey of the area hence there are cases of settlers receiving plots, part of which are not entirely arable due to marshland, which constitutes a social inequity in land distribution.

(4) The green belts have not been assigned. The settlers feel that the green belts should be assigned to them. In the meantime, these areas, totaling 25,000 hectares, are being indiscriminately exploited of their better timber.

Utilization

2.19 Typically the settler clears one hectare a year by slash-and-burn and abandon it to second-growth bush the fourth year.

At this rate he keeps 3 hectares under cultivation while continuing to clear the forest. This amounts to inefficient use of his labor in clearing and excessive waste of the forest that he fells.

D. Marketing

2.20 Settlers commence subsistence farming upon arrival and market surpluses as they occur. Surpluses increase as the years of accumulated resources and experience increase. The project area is extremely isolated, due first to its location near the center of the continent. Secondly, it is critically isolated to the east of Rio Grande, over which there is no accessible bridge. The river is crossed only with difficulty for the duration of the long intensive rainy season (three months). It is estimated that the cost of transporting agricultural commodities across the river equals at least 20% of their market value. Settlement of the project area would not be economically feasible without a bridge across the Rio Grande which provides the settlers ready access to Bolivian and export markets. With such access, along with technical assistance, settlers could be expected to readily adopt cooperative marketing programs which would be relatively efficient.

E. Institutional Support

INC
2.21

The National Institute for Colonization (INC) was established in 1965 as the Instituto de Colonización de Desarrollo de

Comunidades Rurales. This institution was charged with research, planning, organization and evaluation of the national plans for colonization and rural community development. In 1969, The División of Rural Community Development was separated from the organization, leaving the INC as a separate institution under the Minister of Agriculture and as a decentralized entity with autonomy with respect to organization, administration and finances. In 1973, the INC was given exclusive jurisdiction over the colonization of certain lands know as Zone E which included most of the area opened to colonization at that time.

2.22

The principal function of the INC were defined as follows: determine and apply policies governing colonization; provide a coordination function for bringing to bear the efforts of other state institutions in support of colonization efforts; determine if projects developed for colonization conform to national objectives and national plans for rural development; promote inter-institutional arrangements for support of colonization; define means of financing colonization programs; study means of restructuring spontaneous colonization; plan and supervise colonization programs, determine areas to be colonized; orient the new settlers; and grant titles to property to settlers.

The INC structure is regionally decentralized with four zonal offices within each of which are separate action units. The latter usually refer to individual projects.

Within the INC there has been a large proliferation of departments - there are 12 departments - many of which overlap in functions those of other institutions. Clear definition of objectives, division of responsibility and definition of programs are frequently lacking. The planning department has made little progress in defining long term plans. Short term plans are developed on a year-to-year basis with no guidance from longer term planning.

2.23

The personnel of the INC are heavily concentrated in the office in La Paz - 33% of all permanent employees. Of the 372 employees in 1978 only 50 were classed at the professional level. In the San Julian colonization project there were 111 employees with only some 15 at the professional level.

2.24

Much of the foregoing problems are traceable to failure to promulgate statutes defining and limiting the basic attribution of the institution. A global study of the organization and responsibilities of the MACA which is currently in

progress, may clarify the position of the INC. defining its roles and responsibilities.

2.25

CIAT

El Centro de Investigación Agrícola Tropical (CIAT) has the principal responsibility for publicly assisted agricultural development in Santa Cruz Department, which includes the project site. CIAT is an instrument of Ministry of Campesino Affairs and Agriculture (MCA). Its principal support comes from the National budget through MCA and from the CODECRUZ (The Departmental Development Corporation). It receives minimal support from the Gabriel René Moreno University, Santa Cruz, and the Chamber of Agriculture of the Orient, Santa Cruz. CIAT operates a regional experiment station at Saavedras in an ecological zone similar to the project site.

2.26

In addition to a minimal Bolivian staff, this activity is supported by area scientists provided by the United Kingdom Overseas Development Mission, investigating soils, cotton production, livestock and pastures, two scientists provided by AID (agronomy and entomology) and two scientists provided by the Republic of China, investigating oil plants and pineapple production.

A recent appraisal of CIAT's research program found it to be short of operating funds in terms of the work that it "should be" doing. The appraisal also noted that while impressive results had been achieved in identifying environmentally adapted, high-yielding crop varieties, and in testing weed control technology, little had been done to improve the efficiency of farming systems.

2.27

The extension element of CIAT, headquarters in Santa Cruz, effectively consists of seven extension field agencies. Since it is considered that they are already posted too sparsely to adequately service their current clientele, the proposed project could expect no extension assistance from CIAT without providing it funds to employ and support additional personnel.

BAB

2.28

The Agricultural Bank of Bolivia (BAB), which was established with U.S. financial and technical assistance in the 1940's is the principal source of agricultural credit in the country.

2.29

BAB has been a major principle in the development of the commercial agricultural sector of Santa Cruz Department

which was a reflection of the country's long-range development strategy adopted in 1940 (The Bohlen Report).

"Small farmer" loans make up only about 5% of the Bank's portfolio. This is due largely to the following circumstances:

1. The strategy to mechanize the Santa Cruz Plain was successful, developing clients with rapidly expanding credit needs.
2. Loan projects to improve ranching in Santa Cruz and in the Beni greatly expanded the Bank's resources along with increasing the percentage of its portfolio in large-scale loans. These projects have tended to command the services of the Bank's most able personnel.
3. The Bank has maintained a 12% interest rate to all clients, which has not been enough to create and service small-farmer portfolio on a break-even basis.
4. The Government and its supporters from the outside have not been consistent in their quest for financial support to small-scale farmers.

Recent appraisals indicate that BAB is currently in a weak financial position, due to delinquences or defaults on a number of large-scale agricultural and agribusiness loans, inflation, and the Bank's inability to raise loan capital from the economy it supports. Intensive "studies" of the Bank's situation are in progress.

SNC

2.30

The National Road Service (SNC) has been developed in large part with U.S. technical assistance. As the Government's agency for planning construction and maintenance of public roads, SNC has successfully planned, contracted and supervised the construction of thousands of kilometers of roads, largely financed by external sources, in the past three decades. The contracting and supervising of the planning, design and construction of the roads anticipated in the proposed project are well within the capabilities of SNC.

MPSSP

2.31

The Ministry of Social Services and Public Health is implementing with USAID assistance, a rural health service delivering system from Montoro. Although largely inaccessible

due to no bridge across the Rio Grande, the proposed project site is within the bounds of the Montero health service project. The Montero project trains nurses aids and other auxiliary local personnel, and it helps communities organize and orient voluntary health committees, which altogether form a relatively efficient, albeit thin health service delivery system. The physical grouping of the people at the proposed project ideally accommodates such a system.

2.32

MIN. EDUCACION

The Ministry of Education has a policy of providing and paying teachers for communities who provide the pupils and school shelter (up to certain limits, no doubt). This program is working as far up as the fifth year in the proposed project zone. Although the settlers are pleased with the system, the schools are void of school supplies and learning materials.

FIDES

2.33

Fundación Integral de Desarrollo (FIDES) was created in 1977 as an outgrowth of the previous cooperative efforts

of several religious organizations together with Bolivian institutions, principally INC, in colonization programs.

2.34

Prior to the creation of FIDES, in 1968 the technical staff of the Methodist, Catholic and Menonite groups working in the Santa Cruz area organized the United Church Council (UCC) in an effort to resettle flood refugees. Based upon this experience the UCC undertook to assist colonist in the early stages of settlement, the pioneer stage. This assistance consisted primarily of providing orientation in the new environment and certain social and health services and material and technical support. Thus evolved the orientation program which was formalized in the San Julian project by agreement between the INC and the UCC. This program has been highly successful. This program was largely managed by UCC staff utilizing supporting personnel from the UCC and INC technical staffs.

2.35

FIDES was organized as a non-profit private organization to sponsor and manage rural development programs. Its board of directors include besides the Bolivian individuals four members of the UCC. By virtue of this relationship with the UCC, Fides is particularly well qualified to

assist and to participate actively in the planning, development and execution of colonization projects, especially during the pioneer stage.

F. Infrastructure

2.36

As mentioned above the project site lies to the east of Rio Grande, which without a bridge crossing, partially isolates it from the rest of the country. There is an all-weather road from Montero to Puerto Banegas which is the conventional ferry crossing of the Rio Grande to the project site. There is an all-weather road from the east leading from Puerto Banegas to the San Julian river beyond which it will intersect the Santa Cruz to Trinidad road which is under construction. An all-weather road extends from the latter road some 80 kilometers northward through the area of the proposed project known as San Julian North. Dry weather roads penetrate that area of the project zone 5 kilometers from either side of the main penetration road at 5 kilometer intervals (ANNEX 3).

2.37

A four-inch, closed water well, equipped with a hand pump, is located at the center of each nucleo, and serves the 40 families which are clustered in the nucleo village.

2.38

There are minimal to less than adequate headquarters and orientation facilities on the San Julian North site.

There is no infrastructure on the San Julian South site.

III- THE PROJECT

A. Objectives

3.01 The objective of the project is to provide the physical and institutional infrastructure and technical support elements required to cause the colonists in the San Julian colonization area to move from an essentially subsistence agriculture based on slash-and-burn technology to a more commercially oriented, sustainable, permanent system of agro-livestock production.

3.02 The achievement of this objective is seen as necessary (a) to provide for the gradual improvement in the living standard and quality of life of the colonist; (b) to provide stability and viability to small-scale agriculture; (c) to provide a means for more rational resource management in the area--halting or reducing deforestation and the conversion of tropical forests on some of the best soils of Bolivia to low quality, tropical grass lands; (d) the establishment of an ecologically stable environment in the area, based on combinations of annual crops, pasture, perennial crops and forest; (e) to contribute to the national economy through increased production and marketing, reducing the need to import foods and by increasing exportable surpluses; and (f) demonstrating a system suitable for use as a model for future colonization projects and for training Bolivian personnel.

B. Brief Description

3.03 The project will provide funds for (a) construction of a bridge over the Rio Grande at a point to be selected either at the present barge crossing or at some other suitable point above or below the crossing; (b) construction of all-weather approaches connecting the bridge with the existing all-weather roads on both sides of the river; (c) improvement of the lateral road system in the San Julian North sector (chiefly additions of small bridges, culverts or Irish fords); (d) additions to the infrastructure at the existing agriculture services center; (e) expanded research/extension adaptive services including technical assistance in agronomy with particular emphasis on stable production systems; (f) technical assistance in small farmer credit delivery systems; (g) short-term technical assistance in horticulture, livestock, marketing, cooperatives development and forestry management; (h) credit for on-farm capital investment including land destumping, acquiring draft animals and related implements, on-farm storage, animals for livestock production enterprises and short-term production credit; credit for private investment in processing, marketing and transportation enterprises; (i) needed agricultural equipment and materials and transportation equipment; and (j) operating expenses for the extension/research, cooperatives, and credit activities.

3.04 With respect to San Julian South (1) the project will provide funds for the construction of an all-weather road connecting the Puerto Banegas-San Ramón road with the Santa Cruz-Brazil frontier railroad; lateral access roads to the new settlement areas, materials for wells for potable water and infrastructure for an agricultural community service center. Technical and material support including rations and health services will be provided for a four-month orientation program for new colonists. Seeds for the first crop as well as continuation of rations through the first harvest (about 9 months in all) will be provided.

3.05 A project management unit will be organized to direct and coordinate the participation of several government agencies involved --CORDECRUZ, MACA, BAB, CIAT, SNC, INC, MPSSP, and Ministry of Education, as well as private entities, which have been assisting colonization programs and which can contribute to effective implementation of the project--FIDES, UCC, MCC.

(1) The precise location of the San Julian South extension of the colonization area is to be determined by a preinvestment study of land ownership and mapping of the area. This could result in a shifting of the axis of the penetration road. The orders of magnitude, however, should remain about the same.

C. Detailed Description

Infrastructure

3.06 Roads, Bridges. The project will finance a bridge of approximately 960 meters length over the Rio Grande at Puerto Banegas or at another point to be determined by an engineering feasibility and design study. The estimated cost of the bridge, including engineering and design, engineering supervision and construction is placed at US\$12.8 million. This includes surfaced roads to connect the bridge with existing surfaced roads. The feasibility, planning and design study, estimated to cost US\$917,360, is to be financed by preinvestment funds. This basic road and bridge infrastructure will provide all-weather, surfaced road access for the project area to the cities of Montero and Santa Cruz, the principal commercial centers to the west, and to the planned road to the east for connecting the Beni Department with the eastern region of Santa Cruz Department. These facilities will therefore not only serve the immediate transportation needs of the project but also the large, only partially developed areas to the east and north of Santa Cruz as well and contributing to connecting the livestock producing area of the Beni with the feed grain producing area of Santa Cruz.

3.07 Approximately 150 kilometers of existing lateral roads within the San Julian North project area will be improved by providing small bridges, culverts and/or Irish fords. This will serve some 2,400

family units, bringing each within about 7 1/2 kilometers of an all-weather road. Engineering services for design and placement of appropriate structures will be provided by SNC. The installation and construction of these works will be by force account by INC under the supervision of SNC. Estimated cost is US\$150,000.

3.08 Subject to the definition of land ownership, the existing colonized area San Julian North can be expanded by lateral extensions. Such extensions can be accomplished at about fifty percent of the cost per settler, as would be required in totally new settlements. The projected cost for lateral extension of roads to serve 320 new settlers have been estimated to be US\$1,040,000. Only after the cadastral survey has been completed will it be possible to determine the magnitude and cost of investment for lateral expansion of the colonized area.

3.09 Drainage in the Colonization Area. No provisions have been made for drainage in the colonization area. As land is cleared and put into cultivation the need for drainage will become evident. In certain núcleos this need is already evident. The first step for resolving these drainage problems is a reconnaissance study of the area as well as the surrounding area so as to determine the natural drainage courses which could be used. Such a survey is estimated to cost US\$100,000.

3.10 In the San Julian South area of the project preinvestment financing will be provided for a cadastral and land use potentials

inventory displayed on a map at the scale of 1:40,000 prior to layout of a penetration road--see footnote page 3. Funds will be provided for planning and design of approximately 80 kilometers of all-weather road joining the "German Road", with the railroad (an all-weather road is being constructed which will parallel the railroad which connects Santa Cruz with the Brazilian frontier). The planned road would thus connect the project site with Santa Cruz by an all-weather road. Approximately 160 kilometers of access roads will also be constructed to provide access to all village centers by dry-weather roads. The costs of these roads, including planning, design and construction are estimated to be about US\$5.6 million

3.11 Buildings. The project will fund additions to the existing Agricultural Service Center in the San Julian North project area. The additional facilities will include residences for expatriate advisors and Bolivian personnel comprising the research/extension and cooperatives services, and for a credit agent. Eight additional residences will be required. The 88 m² residence for an expatriate advisor will also be required. This will supplement the existing structure consisting of a 90 m² main service center building with meeting rooms, cafeteria, kitchen, offices, two 88 m² residences, 120 m² of bachelor quarters, 62 m² sanitary post, 80 m² shop, 80 m² storage, 22 m² garage, water supply and sewerage disposal and a 240 m² diesel power plant. Plans for the additional structures

are on file with INC. The estimated cost of this additional construction, including basic furnishings and equipment is US\$285,000.

3.12 In the San Julian South sub-area an agricultural service center and health center will be constructed to serve an area of 108 km² and a population of some 1,920 farm families in the immediate project area and some 2,160 farm units already settled on adjacent land. The service center will initially require the same basic structures as those in the San Julian North sub-area described above. The estimated cost of this infrastructure is US\$402,610.

3.13 Wells. Wells for potable water will be constructed for each settlement unit of 40 families. The wells will be drilled to a depth of 40 to 60 meters, provided with sand screen and four inch casing. Hand pumps will be of local fabrication (cylinders are imported). A six-inch diameter well will be constructed and equipped with an electric pump at the Agricultural/Community Center. Wells will be drilled by INC force account using equipment already on hand. The materials for constructing 50 wells and INC force account operation costs will amount to US\$111,000. This figure may be reduced by an amount equal to the surplus pipe and other materials already on hand from the San Julian North project.

3.14 Provision of expanded adaptive agricultural research/extension services to the San Julian North element will require the recruitment of two expatriate advisors. An extension agronomist with specialty

in cropping systems will be appointed for a 24-month assignment which is to be followed by two 3-month term assignments in the last two years of the project. An agricultural credit cooperative advisor will be recruited for 24 months of service. Three months of short-term consultation will subsequently be provided during the last two years. Approximately 20 months short-term consultation will be provided in marketing, storage, cooperatives and other forms of group organizations, forest management, horticulture, and animal production. The estimated cost of these additional personnel over the life of the project is US\$54,850.

3.15 Bolivian personnel to carry out the expanded research extension activities and cooperative services in agriculture production systems at the CIAT Saavedra experiment station and at the project site as well as for the credit delivery system will number 21 professionals who together with supporting staff will cost US\$715,250.

3.16 Equipment and Operations, San Julian North Vehicles for mobilizing the personnel, equipment for research and extension in addition to that currently provided, and operating cost of vehicles and equipment will be provided at a cost of US\$327,340. Per diem costs for travel by Bolivian personnel including per diem for personnel for short-term local training is estimated to cost US\$22,400.

3.17 Credit Fund, San Julian North A credit fund will be established through the Central Bank for distribution to the project beneficiaries (settlers) through the BAF, commercial banks, savings and

and loan organizations and cooperatives. The credit fund will be used primarily for medium- to long-term credit for capitalization of the farming unit, destumping land, acquisition of draft animals and related equipment, limited light mechanization, acquisition of livestock for production purposes, storage facilities and other on-farm infrastructure.

A credit fund in the amount of US\$3,000,000 will be provided to meet the requirements for farm capitalization credit and for production input credit.

3.18 Credit funds will be provided to stimulate private enterprises, especially in the area of small agro-processing plants; artisanal shops for fabrication, maintenance and repair of farm tools, implements, carts, and furnishings; establishment of custom mechanization services; transport, marketing and merchandizing services; seed and nursery stock production; specialized animal production services, e.g. breeding services. A credit fund for these services in the amount of US\$1,500,000 is provided.

3.19 Technical Support San Julian South. An orientation program will be carried out for new settlers beginning in the second year of the project or after a minimal of infrastructure will have been provided to permit receiving new colonists. During the second project year extension and credit services will begin on the order of those

envisoned for the San Julian North area. The cost of the orientation and expanded extension and credit services are expected to be US\$1,440.250.

3.20 Project Management. Funding in the amount of US\$300,000 will be provided for a project management unit. See Chapter IV - Implementation.

3.21 INC Planning. Funding in the amount of US\$500,000 will be provided for assisting the INC in developing long-term plans for future colonization programs. (See ANNEX 16.)

3.22 Project Cost Summary. The overall project cost is placed at US\$21.3 million before allowances for contingencies and inflation. Adding to this figure a revolving credit fund of US\$4.5 million brings the total to US\$25.8 million. Adding a 15% contingency for the Rio Grande bridge element and a 10% contingency for the remainder of the project elements, except the credit fund, brings the total to US\$29.1 million. Adding an allowance for inflation at 10% per year for all elements, except for the credit fund, brings the total to US\$33.3 million. A summary project cost by major elements and sub-projects is given in the accompanying tables.

Preinvestment costs of US\$1.6 million including a 10% contingency are excluded from the above figures.

3.23 Costs are based upon September 1979 prices for equipment and supplies. Estimates for the bridge are based on recent costs for a similar structure in the Beni, adjusted for certain differences in

its structure and to current prices. Feasibility and design costs are placed at 10% of estimated construction costs while supervision was calculated at 7% of constructions costs.

3.24 Roads and building costs are based upon similar construction already accomplished in the project area, adjusted to current prices and verified by consultation with local contractors.

3.25 Operations costs were established at 25% per year of original cost of equipment.

Bolivian personnel costs are based on compensation currently being paid for personnel of equivalent level, plus 25% premium pay for service in an isolated area.

3.26 For the expatriate technical assistance element, the costs are based on salaries paid for equivalent services by international aid agencies together with the customary allowances and perquisites.

3.27 The determination of the amount for the revolving credit fund was based upon projections of credit demand for local destumping, animal traction units, production animals, on-farm infrastructure --storage, fencing, etc--production inputs, and small agro-industries over the four year period of the project.

Table 1
PROJECT COST SUMMARY
San Julian Consolidation
(US\$1,000 's)

Item	Pre-investment	Years				Total
		1	2	3	4	
Technical Service Delivery System		318.3	218.0	224.0	223.0	983.3
Technical Assistance		218.1	218.1	56.2	62.5	554.9
Credit Delivery System		33.7	19.6	27.7	27.8	108.8
Infrastructure		425.0	485.0	430.0	235.0	1,575.0
Total		995.1	940.7	737.9	548.3	3,222.0
10% Contingency		99.5	94.1	73.7	54.8	322.0
Total		1,094.6	1,034.8	811.6	603.1	3,544.0
Inflation 10% per year compounded		109.5	216.2	267.2	279.9	871.9
TOTAL		1,204.1	1,251.0	1,078.9	883.0	4,417.0

Table 2
San Julian South - New Settlement
(US\$1,000 's)

Technical and material support for <u>colonos</u>		255.6	257.2	246.2	256.2	1,008.9
Extension and credit Infrastructure construction				210.2	210.2	420.4
Planning and design	486.0					
Totals	486.0	2,100.2	2,129.9	2,387.9	811.8	7,429.9
10% Contingency	48.6	210.0	213.0	238.8	81.2	743.0
Totals	534.6	2,310.2	2,342.9	2,626.7	893.0	8,172.9
Inflation 10% per year		231.0	282.5	349.6	130.7	993.8
GRAND TOTAL	534.6	2,541.2	2,625.4	2,976.3	1,023.7	9,166.6

Table 3
PROJECT COST SUMMARY
Rio Grande Bridge
(US\$1,000 's)

Item	Pre- investment	Years				Total
		1	2	3	4	
Planning and design	917.4					
Construction		3,054.5	3,039.1	2,030.1	1,049.9	9,173.6
Supervision		183.5	183.5	93.4	90.0	550.4
Connecting road				55.0	25.0	80.0
Total	917.4	3,238.0	3,222.6	2,178.5	1,164.9	9,804.0
15% Contingency	137.6	485.7	483.4	326.8	174.7	1,470.6
Total	1,055.0	3,723.7	3,706.0	2,505.3	1,339.6	11,274.6
Inflation 10% per year		372.4	448.3	333.5	221.5	1,375.7
TOTAL	1,055.0	4,096.1	4,154.3	2,838.8	1,561.1	12,650.3

Table 4
Miscellaneous Components
(US\$1,000 's)

Management Unit	75.0	75.0	75.0	75.0	300.0
Support to INC for long-term planning	200.00	100.0	100.0	100.0	500.0
Total	275.0	175.0	175.0	175.0	800.0
10% Contingency	27.5	17.5	17.5	17.5	80.0
Total	302.5	192.5	192.5	192.5	880.0
Inflation 10% per year	30.3	22.2	24.4	26.8	103.7
TOTAL	332.8	214.7	216.9	219.3	983.7

Table 5

PROJECT COST SUMMARY

Summary of Tables 1-4
(US\$1,000 's)

Item	Pre- investment	1	2	Years 3	4	Total
Totals	1,589.6	8,174.2	8,245.4	7,110.9	3,687.1	28,807.2
Credit Revolving Fund						<u>4,500.0</u>
GRAND TOTAL						<u><u>33,307.2</u></u>

IV. PROJECT IMPLEMENTATION

A. Organization and Administration

4.01 A semi-autonomous project management unit on the order of that established for the Ingavi project and expected to be also applied to a projected Omasuyos - Los Andes Rural Development project, will be established under the egis of MACA to direct and manage the implementation of the project. The participation of the several MAGA Agencies - INC, CIAT, BAB, SNDR as well as those of other ministries, e.g. MPSSP, MEC, SNC will be directed and coordinated by the project unit.

4.02 A Board of Directors with membership from MACA, Ministry of Finance, MPSSP, CODECRUZ, BAB, Ministry of Education will serve as a policy-making and advisory body, providing guidelines and approving budgets for project implementation. The chairmanship would be held by the MACA representative. The Board of Directors with approval of the Bank will apoint a project director who will serve as ~~its executive~~ secretary and as the chief implementation officer of the project.

4.03 The project management unit will establish its own organizational structure and administrative and operational norms, and it will be provided an operational budget from project funds. The project director will be supported by a deputy project director and management and technical personnel as required to supervise and manage the execution of the several implementation functions of other entities.

4.04 The project management unit will contract for or otherwise secure the service of the several agencies which will be participating in project implementation e.g. BAB, SNC, CIAT, INC, FIDES, WFP.

4.05 The project director will be responsible for project implementation within the policies and guidelines established by the board of directors and in accordance with the programs and budgets approved by the board and defined in agreements reached between the government and the Bank. The management unit will include evaluation, accounting and clerical personnel. Technical advise will be provided by externally recruited specialists who will be assigned to the project on long, or, short term basis (III, above).

4.06 The loan funds provided by the Bank will be deposited with the Central Bank. Disbursements to executing

agencies - SNC, CIAT, INC, BAB, etc. will be made directly by the Central Bank upon authorization of the project management unit and consistent with progress made.

B. The Technical Assistance and Credit Delivery System

4.07 The key element of the consolidation program in the San Julian North colony is the establishment of a stable and productive system of agriculture adaptable to the small farmer. In order to accomplish this it will be necessary to introduce and demonstrate a number of production models. These have been developed based upon available research information in the area. Additional and no doubt improved models are expected to emerge from the research on farming systems provided for in the project.

4.08 The adaptation and demonstration of these models on a sufficient scale to permit evaluation and transfer of the systems to the colonists will require a technical staff of 19 individuals assigned as residents in the project area. CIAT will be requested to assume the primary responsibility for the research and extension program.

The research work will involve the Saavedra Experiment station to which additional facilities and personnel will be provided to carry out adaptive research in farming systems. The extension staff will be posted in the project area. A director and deputy director will be stationed at the Agriculture Service Center. Personnel of the técnico agrónomo level will be posted in each NADEPA.

4.03 At the nucleo level, auxiliary assistants recruited in the nucleo and paid small salaries to assist the técnico agrónomo. The research extension staff will be supported by organizations/cooperatives agents, especially in the area of group action, to improve marketing, input and consumer goods distribution and in establishing small scale agroindustries as well as services which the farmer will need. Home improvement agents will foster better nutrition and health care.

4.10 What may seem to be a particularly intensive extension service is justified on the basis that the San Julian consolidation project is the first organized effort at colono consolidation in the Santa Cruz area and will be introducing a wholly new system of agriculture in a tropical forested area. The project will thus serve as both a

learning and a training experience for the Bolivian institutions involved. As project implementation progresses it will be possible to reduce the numbers of personnel by transferring them to adjoining settlement areas.

4.11 A rural financial services unit will be established at the project site. (This term is used in recognition that while production credit is critical to socio-economic progress, the settlers' financial service needs are much broader, many holding precedence over production). A credit agent and a clerk/cashier posted at the project site, will process most production loans in the field, thus increasing the efficiency and expediting the lending process. Application for long term investment loans, along with appraisal data, will be referred to the EAB Agent in Montero where prompt action would be anticipated.

With the general availability, in the nearby centers of Montero and Santa Cruz, of all of the inputs which are expected to be needed specific provision for wholesale supply of inputs will not be necessary. To provide for local distribution, existing cooperative structures will be strengthened and the creation of new ones encouraged. Credit will be provided to assist these organization in maintaining adequate stocks of required inputs.

4.12 It is proposed that a strong, multipurpose cooperative be developed, embracing the project population with subordinate service units at the MADEPAs. Among other services (production input supplies, consumer goods supply and marketing) the cooperative would operate a savings and investment program and provide other financial services, such as selling money orders to the settlers. As the project progresses the cooperative could aspire to provide complete banking services.

4.13 While initially the Agricultural/Community Center farm will be the principal source of seed and plant material, encouragement will be given to private individuals to undertake to provide these services.

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C. San Julian South (new colonization area)

4.15 During the life of the project it is expected that about 3 NADEPAS i.e., 27 nucleos or 1080 units will be settled in San Julian South. In the first year the principal activities will be construction of the basic transportation infrastructure; the layout of the first group nucleos, well construction for potable water and in the organization of the administrative and technical structures for the orientation program for the first group of colonos.

4.16 The first group of colonos will be received during the months June to July for participation in the orientation program so as to be prepared to plant the first crop with the beginning of the rainy season in October-November.

4.17 The orientation period provides an opportunity for the new settler to become established before the first agriculture cycle. During this period he builds his house and clears approximately one hectare of forest for his first crop. At the same time he receives instructions in health care and in agriculture technology peculiar to the tropical setting. Seed is provided for the first agriculture cycle.

A few young fruit trees are also provided.

The orientation program will be implemented by INC in collaboration with FIDES. The only important variation in the present orientation program will be a greater emphasis on technical agriculture. This preparation will facilitate the settler's participation in the proposed farming system, the first or no later than the second cropping cycle.

Through social development programs he is encouraged to develop village organization and cooperative structures.

4.18 During the orientation period the colonists are provided group shelter and rations. The rations continue beyond that period for a total period of nine months, up to about the first harvest.

4.19 As the colonists become settled and the orientation program is phased out, technical support in the areas of extension, cooperatives and credit on the order of that described for San Julian North will begin. These services will be provided by CIAT using personnel who had participated in the San Julian North program or who had received training in that program.

4.20 The estimated investment for personnel, equipment, materials and supplies, operations and rations for nine months for the colonists and their families for the settlement of nine nucleos comprising 360 family units each year for the last three years of the project is \$1,440,250. This includes expansion of the technical and credit services described for San Julian consolidation area beginning with the first agricultural cycle. This represent a cost per family unit settled of \$1,333. When added to an estimated infrastructure cost of about \$2,675 per family places the total per family cost of \$4,008.

D. Participating Institutions

INC

4.21 INC will continue to exercise general control over the expansion of the colonization program. It will receive and process applications for settlement, deliver settlers to the site, assign them to nucleos, provide them rations and an orientation program.

4.22 INC will also be responsible for representing the settlers in the acquisition of their deeds of title to their assigned land.

Agrarian Reform

4.23 The Agrarian Reform Service will collaborate with INC in identifying the San Julian South project site, and will, with outside preinvestment assistance conduct a cadastral survey of the site and further certify that the title to the site is truly unincumbered and exclusively available for colonization with the proposed project assistance.

4.24 The Agrarian Reform Office will clarify the terms of grants for colonization, bring the issuance of deeds of title to San Julian North settlers up to date and remain current of these issuances.

SNC

4.25 The responsibility for construction and maintenance of primary penetration roads will rest with SNC. Construction of these roads will be done under contract with supervision by SNC. In new colonization areas and extension of old ones the design of lateral roads will be the responsibility of SNC. SNC will also supervise the construction of the lateral roads whether by contract or by INC force account.

The project management unit will enter into an agreement acceptable to the government and the Bank for SNC to assume the responsibility for the task briefly defined above.

CIAT

4.26 It is expected that CIAT would draw upon its considerable resources at its Saavedra Station and elsewhere to support its research and extension program at the project site. Recognizing CIAT's limited resources in relation to its existing responsibilities, the proposed project will provide reinforcements of both long-term technical advisers and consultants.

FIDES

4.27 INC will contract with FIDES to produce the orientation program.

BAB

4.28 Credit funds for lending to the project beneficiaries will be channeled from the Central Bank through the BAB and its agency in Montero. A sub-agency to be established in the Agricultural Service Center will manage the BAB portfolio and promote cooperative credit services in the project area.

MEC

4.29 It is proposed that the Ministry of Education continue to provide teachers for schools where the shelters are provided by the benefitting population. In years beyond the life of the proposed project there will no doubt be a local demand for teachers of additional grades. This issue should be duly considered at the appropriate time.

MPSSP

4.30 The project site lies within the bounds of the Montero district of the MPSSP rural health services delivery system which is assisted by USAID. These services will be extended to the project. Infrastructure to support this program is provided in the Agriculture Service Center.

WFP

4.31 The World Food Program has contributed food staples to the San Julian North settlement and will continue to do so through 1981. Whether it will continue this program beyond 1981 cannot be determined at this time.

OXFAM

4.32 OXFAM has provide locally produced foodstuffs to the settlers while in the orientation program. Whether this program will continue is uncertain.

E. Monitoring and Evaluation

4.33 Both process and product type evaluation will be employed in monitoring the project. A base line interview was conducted in 1979, which established basic socio-economic characteristics of the population and characterized its basic economic skills. This survey would be repeated annually beginning the second project year, on an indicative sample basis to indicate trends, to measure the rate of adoption of new technology, to evaluate the new technology and to uncover unanticipated areas of weaknesses in the program.

4.34 In the second and fourth years of the project, process evaluation would be made with the assistance of evaluation experts who are external to the project. The following elements would be appraised:

1. Basic philosophy and design.
 - a. observed reliability
 - b. adaptability
2. Planned resources and events: Timeliness and adequacy of:
 - a. infrastructure
 - b. institutional support
 - c. technical assistance
 - d. supporting commodities

3. Unplanned resources and events:

- effect on planned project outcomes

4.35 The baseline interview survey should be repeated near the end of the project to obtain data against which socio-economic change may be measured.

V. THE PROJECT FARM MODEL

5.0.1 The essential characteristics of the farm model are: a) provision for continuing use of the land once cleared with multiple cropping and rotation of crops with leguminous forage/pasture plants as a means of optimizing production, capitalizing on the investment in land clearing, conservation and improvement of soil fertility, and management of weeds; b) provision for integration of perennial crops and intensive livestock in the production unit; c) flexibility in choice of elements as well as with respect to timing and d) designed to provide for gradual self capitalization of the farming unit as a stable small farmer production unit.

5.0.2 The farm model addresses the overriding constraint to agriculture in the project area, which is the invasion of secondary woody growth, native grasses and other weeds, which cause successively reduced crop yields, leading to the abandonment of the land or relegating it to low quality bushy pasture. The model would achieve weed control by providing a continuous ground cover of economic crops. Supplemental, mechanical and/or chemical weed control may be required.

The farmer's cropping objectives are achieved by interplanting shade-farming species, such as maize, soybeans, and sweet potatoes, with a compatible species with lesser shading characteristics, such as rice and vegetables. Continuous ground cover is maintained by successive interplanting of shade-farming crops. In the final cycle of the third year, maize is interplanted with kudzu or a similar perennial forage legume. The legume is allowed to completely cover the ground and shrubs or weeds that emerge are removed mechanically.

The legume is left on the ground two years, or longer if desired, serving as a suppressant to weeds and invading shrubs and as a soil builder through the fixation of nitrogen. The legume is used as pasture for cattle and swine. The project provides funds for removing stumps the sixth year, after which the cycle is repeated, employing one of six or more variations. One hectare would be devoted exclusively to fruit and vegetables. Land not cultivated would be treated as managed forest.

5.0.3 This model makes use of the land the year-round in perpetuity, thus maximizing efficiency of resource use and farm labor (cleaning and weed control). It includes soil-building crops and

provides for the integration of intensive livestock production into the farming system. It provides flexibility in the choice of crops, as well as with timing. It provides for gradual self-capitalization of the farming unit as a stable, small-farm business.

5.0.4 The model is evolutionary in that it begins with a traditionally oriented farmer producing traditional subsistence crops, and introduces new concepts and practices in an orderly sequence over time. The complete package including the above cropping mix and cycle and livestock enterprises with animal traction for cultivation and transportation, mechanical threshing and on-farm storage are introduced to the settler over a period of about six years. On-farm storage and livestock are the principal additions to the farm infrastructure.

5.0.5 By the tenth year of exploitation, the average, 50-hectare farm employing the model, will include six hectares of annual crops on a double or tripple-cropped annual basis, one hectare of tree crops and garden crops and three hectares of legume pasture, but no barbecho. Forty hectares would remain in original forest. The annual farm income would be \$44,408, and the net worth of the farm

would be \$140,380.

5.0.6 In comparison, at the tenth year of exploitation, the average, 50-hectare farm employing the traditional model would include three hectares in annual crops, cultivated at an intensity of one to one and one-half crops per year, three tenths of a hectare of tree crops and garden crops, two and one-half hectare of native grass pasture and 6.2 hectares of barbecho, or abandoned land. Thirty-eight hectares would remain in forest. The annual income of the farm would \$2,148 and the net worth would be \$26,750. (Annex 9).

VI. PRODUCTION MARKETING

A. Demand Outlook

6.01 Sixteen crops were found to be: a) environmentally adapted to the project site, b) compatible with the farming system model, c) contributable to the easement of the national foreign exchange burden and d) profitable for its settlers to produce. A discussion of the major prospects follows:

6.02 Maize is a major subsistence crop and a key crop in the farming model, and a surplus is readily produced. There is an active and growing demand for maize, both as poultry feed and as cattle feed. Typically, it becomes one of the first crops at the settlers disposal. Experimental results achieved at the CIAT Saavedra station suggests that present yield can be greatly increased by using certain CIMMYT varieties.

6.03 Rice production ranks about equally with maize production. It is a subsistence crop producing a surplus for which there is a ready market. For the past several years, Bolivian rice production has been slightly above consumption; however, internal demand continues to grow. The 1979 crop is slightly below national consumption. There are experimental indications that yields can be increased considerably from the present average of 1700 Kg per hectare.

6.04 Soybeans and peanuts are attractive crops for its settlers and the region. The crops would respond to the country's shortage of cooking oil, and there is strong demand for the cake or meal by-product of these commodities for poultry feed.

6.05 Swine are an integral part of the farming model, as they are used to consume, thus reduce the bulk and increase the market value of legume pasture (one essential element in the model), yucca (manioc) sweet potatoes and maize. Domestic pork production is increasing in line with the growth of the Bolivian population and gross domestic product. Approximately, \$us.6 million worth of pork lard is imported annually.

6.06 A mixed cattle enterprise fits well into the scheme, in that it makes use of the legume pasture essential to the system. Part of the enterprise is the growing out of animals for beef. The other is milk production. (It is noted that the Bolivian milk industry is presently suffering a setback from a national policy to restrain the retail price of milk. The Government limits the price that its principal processing plant, FIL, can pay farmers for milk. This policy is a serious disincentive to milk production in Bolivia. It is hopeful that this policy can be changed).

6.07 Certain vegetables which are readily transportable are attractive. Some, such as edible beans and chiles (*Capsicum frutescens*), which have

high unit value and are easily transportable, are especially attractive due to shortages in the world market for the foreseeable future.

6.08 A number of tree crops fit well in the scheme. Cacao, which is likely to be in world short supply for many years for the foreseeable future, appears to be adopted to the northern part of the project. The coconut palm is attractive, first as a fresh crop, then as an oil crop.

B. Strategy

Transportation

6.09 The problem of remoteness. The farmers of the project site are at a relative disadvantage due to the remoteness of the world markets. The project strategy would counteract this by increasing the unit value of feed, forage and root crops by marketing them through livestock. High unit value specialty crops will be worked into the farm model as they are tested and proven.

6.10 The Rio Grande Bridge. While the proposed Río Grande bridge was justified on the basis of benefits accruing to transportation, unrelated to the project area, the project would not be economically feasible without it.

Diversification

6.11 Given the extreme fluctuation of agricultural prices, the meager amount of resources to fall back on, the San Julian farmer should diversify to a considerable extent. This is consistent with the proposed crop

model which requires a variety of crop species. The model provides for producing maize, rice, soybeans and peanuts, any of which can be emphasized or deemphasized as the market outlook. Specialty crops of high unit value are proposed for inclusion in the production model as the settlers, preferably on a nucleo on NADEPA basis, are ready to undertake them and manage them so as to deliver high quality products. That chillies and cocoa are promising examples. Other tree crops, including citrus and coconut palm would be included. Coconuts should be grown to supply the oil extraction mills in the Santa Cruz-Montero area.

6.12 Vegetable are included in the model, both to enhance the farm family diet and to supply the Montero-Santa Cruz markets. The mix of vegetable crops would be adjusted to reflect market prospects after subsistence requirements are met.

6.13 Swine and milk production would be included in most systems. When milk prices are unfavorable, as they presently are, the milk would go into cheese production. In the early stage of development the growth and off take of the herd would be equally as important as milk production. Grazing cattle, either owned by the colono or on a fee basis, will be necessary to market legume pasture, which from the standpoint of time and area, occupies at least two-fifths of the production model.

Farm Storage

6.14 Provisions would be made for storing staple commodities on the

farm for limited periods, primarily to overcome customarily depressed harvest-season prices, but also to facilitate group assembly and marketing.

Maize and rice would be the principal commodities stored, although other, strictly subsistence commodities would be accommodated.

6.15 Storage facilities will be accompanied by a drying patio for sun-drying grain and other commodities.

Local Processing

6.16 Small-scale agribusiness would develop in the project area, first for custom threshing of rice, soybeans and peanuts than for processing milk.

Group Marketing

6.17 The settlers at the project site undertook group marketing of maize by advanced contract in 1979. This practice is expected to grow, eventually, into a marketing cooperative with substantial volumes, for the major crops, at least.

VII.

FINANCIAL ANALYSIS

7.01 The farm output accruable to the project will result in a substantial improvement in income of the settlers and at the same time contribute to substantial capitalization of the farm unit.

According to the model farmers will show a negative cash income during the first year as compared to a small cash income for the traditional production system. This is due to the amortization of investments made during the first year. From the second year onward the cash income from the project model is greater than that for the traditional model. This spread will continue to increase over time. During the fifth and tenth years the percentage increases over the traditional farm model are calculated to be 600% and 2,000% respectively. These values refer only to cash income, including remuneration to family labor. Other benefits in the form of increased consumption of a more diversified diet are also expected to be consequential.

7.0.2 Equally important as the expansion of cash incomes is the capitalization of the farm unit. Under the traditional system capitalization is limited to the value of cleared land, pasture and livestock, which grow at a relatively slow rate. The project production model also begins with a slow rate of capitalization. However, it increases rapidly as land is destumped the livestock herd increases; animal traction and mechanical threshing are introduced; and additions are made to farm infrastructure - storage and drying facilities for grain and livestock related infrastructure. The level of on-the-farm capitalization is expected to reach a level tenfold that of the traditional farm model after ten years. Not included in these calculations is the anticipated reduction in the rate of deforestation.

7.03 The income per farm is expected to rise from \$2,622 in the first year to about \$44,408 by the tenth year, while on-the-farm capitalization is expected to attain the figure of \$142,380 by the tenth year.

7.4 By comparison, the farm income for the traditional model is estimated to grow from \$22 during the first year of settlement to \$2,148 in ten year, and the net worth is expected to reach \$26,750.

VIII. ECONOMIC ANALYSIS

A. Benefits and Justifications

8.01 The proposed project is divided into three separate elements each of which is analyzed separately.

The San Julian North Consolidation Component

8.02 By 1980 about 2,400 families shall have been settled in the project site. The settlement is expected to grow to some 3,150 families by the third year of the project. These families are mostly recently settled (one to three years) except for a few older settlers who settled spontaneously beginning in 1970. Typically, the settlers have arrived without any capital and with virtually no technical or managerial knowledge of tropical agriculture. Their production activities have followed the usual pattern for settlement in the tropical forest areas, i.e., initially, the slash-and-burn production of subsistence crops of rice and maize with limited production of fruit and vegetables. Their production expands gradually until marketable surpluses are generated. A limit is rapidly reached, however, due to the limited area of land that a farmer can cultivate using the farming system and production methods they have adopted. Further expansion of production and income is generated by introducing livestock enterprises. This is also limited by the poor quality of pastures resulting from the system and limited land area.

8.03 Under the project these limitations are removed by introducing a system of continuous land use through technical advisory services and by providing credit for the initial stages of capitalization. Finally, the farm becomes self-capitalizing to a large extent.

8.04 The value of incremental production under the project is estimated to be \$us.330,650 during the first year, increasing to \$us.2.3 million by the fifth year and \$us.4 million by the tenth year. The production will consist mainly of food crops, including feed grains. The increase in production of feed together with leguminous pastures and forage will be marketed through the livestock enterprises. It is expected that the milk produced will be largely processed locally in small plants. An expanding market for feed grain appears to be developing in the livestock producing areas of the Beni, where surpluses from the project area will likely find a ready market.

8.05 Other significant project outputs include transferable experiences gained in the development of a stable agricultural system and the training provided to participating Bolivian personnel. Experience with colonization in tropical forest areas over a period of some 25 years has shown that the mere settlement of colonists on land does not necessarily lead to the emergence of a self-sustaining growth and development. Although in general the lot of the colonist is usually improved from that which was obtained in the overcrowded Altiplano, the level of improvement rather quickly reaches a limit beyond which it is difficult

to surpass due to the lack of better technology and of capital. This project is the first serious effort to consolidate a settlement area. In introducing an efficient, scientifically and socially sound technology for consolidating settlements, the project will contribute to reducing the costs and time lag in launching new colonization projects in a self-sustaining development pattern.

8.06 The project will have a very significant impact on forest resources. Under the traditional system the forest is rapidly destroyed as new land is cleared while land is retired to non-productive barbecho each year. Over the 20-year period the project farm model will require only about one-fourth as much cleared land as the traditional system to maintain the same area under cultivation.

The San Julian South New Settlement Component

8.07 The San Julian South component would provide the infrastructure (roads, wells, and administrative structures) for 2,150 families and assist in settling 1,080 during the life of the project. The early phase will consist primarily of establishing basic infrastructure. By the end of the project, approximately 360 families would have been settled for three years, 360 families for two years and 360 families for one year. With minor modifications to accommodate soil and climatic differences, the systems and procedures proposed for the San Julian North component would be used. Up to the end of the project 50 percent of their production would be retained for subsistence. The road infra-

structure established will also serve approximately 2100 established settlers who currently do not have an effective all-weather road outlet.

8.08 By the end of the project it is expected that the settled families would have a cash income of \$b13,500, of which \$b.10,000 would be attributable to labor income. At the same time the average settler would have gained a net worth of approximately \$b.6,000 in terms of land improvement and farm infrastructure. The family's probably alternative would be the wages as farm laborers on the large farms which will be on the order of \$b.10,000 per year.

8.09 Indirect benefits in terms of improved diets and in terms of conservation of forest resources would be on the order of that described for the San Julian North consolidation component.

The Rio Grande Bridge Component

8.10 The Rio Grande river separates the project area from the developed area to the west which includes the important commercial centers of Santa Cruz and Montero. Since these centers provide the principal markets for agricultural products as well as source for production inputs and consumer commodities the difficult river crossing imposes a serious handicap to the settlers in marketing their commodities. Not only does this transportation handicap increase the cost of marketing but it also imposes a serious restriction on the provision of both

public and private services to the area. Unless a bridge is constructed over the Rio Grande linking the project area through an existing all-weather road to the highly developed west bank, further investment in the project area cannot be justified. Aside from being essential to the future of the San Julian project, a bridge over the Rio Grande would connect the developed west bank with the largely undeveloped but potentially rich, particularly in forest resources, area to the east and the developing area of the Beni.

8.11 Without, however, calculating the indirect benefit referred to above, the savings on transportation costs alone is currently estimated to be \$us.1,768,750. This figure will increase at about 7 percent annually until the bridge is completed, based on the projected annual rate of traffic increase. The detailed analysis of the bridge component is given in ANNEX 6.

B. Economic Rate of Return and Sensitivity

8.12 For economic analysis the cost of all components have been taken into account, whether productive or not-directly productive. Among the productive elements, labor was costed at the prevailing wage rate in the commercial agriculture sector, i.e., \$b.50 per day. Inputs were costed at prevailing costs in the area. The market prices used were derived from current market prices, recorded fluctuations in recent years and consultations with knowledgeable individuals in the area. Yields are conservative estimates based on recorded yields and yields reported

in regional trials by CIAT.

8.13 The projects overall costs, including physical and technical infrastructure and services delivery system and external technical assistance, are charged at full costs. Three calculations of the internal rate of return were made: a) for the farm level operation in the San Julian North consolidation component; b) for the overall San Julian North consolidation component; and c) for the Rio Grande bridge.

8.14 The IRR for the farm unit was 55 percent. The sensitivity analysis resulted in an IRR of 25.89 percent if benefits were reduced by 10 percent, 34.61 percent if costs were increased by 10 percent, and 19.57 percent if both benefits were reduced by 10 percent and costs were increased by 10 percent. The greater sensitivity to benefits is a reflection of the gradual evolution of project benefits as the production system is perfected and as the colonists increasingly adopt the system. Because of the low initial level of technical capacity of the colonists and the radical departure from the traditional system proposed, conservative estimates of the adoption rate were used throughout the projections.

8.15 The IRR for the overall San Julian North component of the project is calculated to be 12 percent. The relatively low rate of return is due to several factors: a) a substantial external technical assistance element which is charged at full cost; b) a heavy Bolivian technical support element, also charged at full costs; and c) a slow rate of

accrual of project impact, as mentioned in the paragraph above. The high level of local technical support services supported by external technical assistance is justified on the basis that the proposed production model is totally new to the area, requiring intense efforts for its introduction. The proposed pyrimial delivery-feedback system is apparently new to Bolivia, thus a substantial local training element is implicit in the structure. This system, including the concept of local management of credit through close cooperation of the technical services and the credit agency will permit expansion of the system to other areas at little additional cost. The overall relatively high project cost is also offset by the potential for evolving a pattern for new settlement areas so as to short-cut the period between settlement and the attainment of self-supporting development by the colonies.

8.16 The IRR calculated for the Rio Grande bridge is 22 percent (ANNEX 6).

C. Environmental Impact

8.17 The project site is divided into two areas, one known as San Julian North, which is partially settled and one known as San Julian South, which is . settled.

8.18 The settlement design for San Julian North reserved 10 percent of the climax forest in 500 meter-wide green belts crisscrossing the project area at 5,000 meter intervals. No other provisions were made for preserving the flora and fauna of the project area. The farming practices currently followed by the settlers destroy the climax flora at an unnecessarily accelerated rate and results in secondary regrowth and weed invasion to the extent that it becomes uncultivable.

8.19 The proposed project would introduce a farming system that suppresses secondary regrowth and weed invasion by providing a year-round ground cover, thus stabilizing or improving the environment in an agricultural setting.

8.20 It is proposed that the green belts be managed as a perpetual forest, producing the climax plant species and providing shelter for the fauna. It is further proposed that 2,500 hectares, in-

cluding approximately 2,000 hectares of marshland in the project area, be preserved as an environmental control point area and wildlife refuge.

8.21 Similar measures would be taken in planning the San Julian South area.

IX. POLICY ISSUES

A. Land Policies and Practices

9.01 Clarification and Ownership. Land policies are defined by the Agrarian Reform law. While the law is apparently designed for nationwide application, there has apparently been little application in the Department of Santa Cruz. This is apparently largely a consequence of the lack of urgency given the extensive area of unused land in the area.

9.02 The adjudication of all land ownership is the responsibility of the Agrarian Reform Department of the MACA. Land is adjudicated according to criteria defined by law. Moreover, the Agrarian Reform Department has given blocks of land to the INC for colonization purposes. In the absence of a cadastral survey, as a consequence of the apparent lack of coordination between Agrarian Reform and INC, and the lack of an up-to-date land registry, frequently lands set aside for colonization are found to have been in part adjudicated to private ownership. As a consequence the design of infrastructure to serve a colonization unit becomes difficult and increasingly expensive. Conflicts frequently arise between private claimants and the INC as well as between spontaneous colonists who have been given colonization rights by the INC and private owners.

9.03 Inefficient Allocation and Use of Land. The granting of land to individuals, cooperatives, and syndicates has been a common practice. This appears to have been implemented in a rather loose fashion

without much concern for the use criteria set up by law as a basis for land ownership. The result has been that large areas of land have been granted which remain largely unutilized or underutilized. As a rough approximation, it would seem that were the apparently unused land, and the large areas of good soils which now lie in poorly productive pasture and/or barbecho --a consequence of the "barbecho crisis"--in the "integrated zone" of Santa Cruz, accessible to colonists, virtually all the potential colonists during the next several years could be accommodated in an area with already established infrastructure, at a fraction of the cost of current colonization programs.

9.04 To continue the apparently haphazard application of policies may well result in the creation of a new state of latifundio. There are ample examples already in early colonization areas where small land parcels settled by colonos have been aggregated to larger holdings practicing extensive livestock production on some of the best soils of the country, while at the same time there exist extensive areas of land which are primarily suited for livestock.

9.05 Recommendation. An in-depth evaluation of land policies and their implementation, especially in the area of Santa Cruz, should be undertaken as soon as possible.

9.06 Land Titling. Settlers of land in sponsored colonization areas as well as those in areas allocated for spontaneous colonization

are promised deeds of title to their lands. In practice, however, the granting of titles has moved much slower than the settlement process. Thus only about 50% of the settlers in Chané-Pirai area have received deeds of titles, although these settlements date back as far as 15-20 years. Few titles have been granted in the older settlements of San Julian. In the more recent settlements certificates of occupation have been issued which promise a clear deed of title after two years exploitation. This period is understood to have recently been extended to five years. This delay in granting titles to land creates a measure of insecurity which no doubt adversely affects the use of land by the colonist and especially his efforts to capitalize his farming unit.

9.07 Since one of the major objectives of the consolidation program is to capitalize the production unit over time so as to make it more productive, the failure to promptly grant titles will tend to compromise the impact of the project.

9.08 Recommendation. The condition of ownership of the colonization grant land should be made clear to the settlers, and the issuance of deeds of title should be brought up to date and kept on a current basis.

B. Forestry

9.09 By law the forest is the property of the state. Concessions to exploit the forest resources are issued to individuals or corporate

entities. As the forest is cut down and logs are delivered to saw-mills a lumber tax is levied as a function of the volume of the logs delivered. For logs which are exported a similar tax is levied at the time of export. This system has apparently worked well so long as logs were being cut from large areas of unsettled land. With the settlement of colonists in forested areas a number of problems have arisen which suggest a need for a redefinition of forestry policies and practices.

9.10 In the first place, the forest in the colonization zone represents a very valuable resource, which if rationally exploited would pay for a substantial part of colonization costs. Under present conditions the forest areas have been or are being high-graded by tronqueros both legitimately and apparently frequently illegitimately. The remaining timber, which represents a substantial volume of construction lumber, is usually cut by the colonists and burned as they clear the land. This represents a substantial loss.

It is estimated that on average each colono parcel contains about US\$5,000 worth of marketable timber.

This waste of a valuable resource is a reflection of the lack of a clear cut, at least in practice, definition of the rights and responsibilities of the colonist and of the tronquero.

9.11 In the San Julian colonization area certain areas (principally a band 500 meters wide around each núcleo) was set aside as

a forest reserve. Although the supervision of forest reserves is the responsibility of the CDR (national forest service), the spatial disposition of the greenbelt reserves in the colonized area is such that management and surveillance of these properties by CDR will be virtually impossible.

9.12 Recommendations. It would seem that both of the problems raised above could be resolved by the following actions: (1) Allocating to the colonists the timber rights on his particular parcel. The judicious harvesting of timber from his plot would essentially pay for capitalizing the farm unit. Since according to the farm models proposed by the project about three-quarters of the plot area will remain in forest for the first ten years, and half will remain in forest for perhaps as much as 25 years, the management of these forests, with some technical assistance from CDR, could also yield substantial benefits. (2) Allocating to the community (NADEPA level) the rights and responsibilities attached thereto for the proper management of the forest reserves (greenbelt) within its boundaries, with the proceeds from rational exploitation to accrue to the NADEPA for supporting public works, road repairs, and other works of public interest. In either case the individual and the community would pay the usual taxes.

C. Prices

9.13 The Government fixes prices at retail for most agricultural commodities. At the production level prices are currently fixed for sugar at a level above world markets. This is reflected in the retail price for sugar as well. For other commodities there has been limited, ad-hoc price fixing at the producer level by intervention of state corporations in the market, e.g. ENA with respect to rice. The principal effect of price fixing has been to keep consumer prices low for locally produced foods (sugar is an exception) and to serve as a disincentive to agricultural production. The ad-hoc price fixing by intervention of state corporations has generally failed to stabilize markets.

9.14 Recommendation. Government intervention in domestic food prices places undue burdens on scarce government human resources and acts as disincentive to production. The practice should be stopped.

D. Credit

9.15 Credit has been used to stimulate and in some cases to discourage production of given commodities. When deemed desirable large amounts of credit have been allocated to production of given commodities, e.g. rice in 1978-1979, vegetable oil crops between 1976-1977 and 1978-1979, maize for the 1979-1980 crop. At other

times the withholding of credit has been used to discourage production, e.g. rice for the 1977-1978 crop.

These actions have usually involved only the large farmers. The effect has been more to destabilize the markets for the commodities rather than to stabilize them, with adverse consequences for the small farmer. The heavy debt load and high rates of arrears among the commercial producers can also be blamed in part to this practice.

E. Taxes, Tariffs and Subsidies

9.16 Export taxes represent one of the important sources of revenue for the Government, and tend to be high. At the same time import taxes are also high with the result that the price of agricultural inputs are increased.

The combination of these two taxes has the effect of raising the cost of production of domestically consumed commodities and reducing the competitive position of exports.

9.17 Production subsidies for sugar and consumer subsidies for wheat flour tend to decrease competitive position of sugar in the export market while consumption of wheat (a substantial portion of which is imported) is encouraged; consumption of locally produced, import substitution commodities--rice, maize, yuca--are discouraged, and the local production of wheat is discouraged. Price subsidies

also tend to encourage the importation of dairy products, edible oils, and lard while discouraging production.

9.18 Recommendation. Since these are long-standing practices by the Government, there should be little doubt that it is aware of the economic hardship which they bring upon the country, its food supply and its farmers. Our purpose is to establish the point that these practices will have a direct, negative impact on the proposed project. It is recommended that the issue be treated with the Government in the proper forum.