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CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-44

1. PROJECT TITLE Sub-Tr. Lands Development			2. PROJECT NUMBER 511-T-050	3. MISSION/AID/W OFFICE Bolivia
5. KEY PROJECT IMPLEMENTATION DATES			4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <u>18-12</u>	
A. First PRO-AG or Equivalent FY <u>75</u>	B. Final Obligation Expected FY <u>75</u>	C. Final Input Delivery FY <u>81</u>	6. ESTIMATED PROJECT FUNDING A. Total \$ <u>15,304,000</u> B. U.S. \$ <u>9,700,000</u>	
			7. PERIOD COVERED BY EVALUATION From (month/yr.) <u>9/74</u> To (month/yr.) <u>11/78</u> Date of Evaluation Review <u>12/78</u>	

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, P.O., which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
A. The BAB - Agricultural Credit component of the project should be terminated	RDD	6/79 (Completed)
B. The Mission should explore possibilities of financing an OPG project to develop methodology for assisting development of colonization areas in the consolidation phase.	DPE	8/79 (Completed)
C. The Mission should further investigate the feasibility of a consolidation phase project for the San Julian-Chané-Piraí area.	RDD	9/79 (Completed)

DPE
DD

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS			10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT	
<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify) _____	A. <input checked="" type="checkbox"/> Continue Project Without Change	
<input checked="" type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	_____	B. <input type="checkbox"/> Change Project Design and/or	
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	<input type="checkbox"/> Other (Specify) _____	<input type="checkbox"/> Change Implementation Plan	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	_____	C. <input type="checkbox"/> Discontinue Project	
11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)			12. Mission/AID/W Office Director Approval	
Evaluation Team Gary Alex, AID - Project Manager <i>Gary Alex</i> Javier Ballivián, IND - Project Coordinator <i>Javier Ballivián</i> Loring Waggoner, DPE (independ) <i>Loring</i> Harry Peacock, Project Advisor <i>Harry Peacock</i>			Signature <i>Abe M. Peña</i>	
			Typed Name Abe M. Peña	
			Date 2/15/80	

SUMMARY STATEMENT

EVALUATION OF

AID PROJECT 511-T-050

SUB-TROPICAL LANDS DEVELOPMENT

USAID/BOLIVIA

by

**Ronald V. Curtis
AID/DSB/RAD**

December, 1979

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BOLIVIA EVALUATION

I. PREFACE

In July 1978, USAID Bolivia requested the Rural and Administrative Development Office of the Development Support Bureau (DSB/RAD) to field a team to conduct an indepth evaluation of AID Project 511-T-050, Sub-Tropical Lands Development. The scope of work communicated by the Mission was to determine progress towards achievement of project purposes, with principal focus on the San Julian Project area, and examine explicitly the following areas of concern. (Telegram La Paz 5183, July 1, 1978):

- A. Environmental: What are the principal consequences associated with the project activities? Are any of these consequences permanently harmful or irreversible? Is there a serious danger of permanent negative consequence to important classes of fauna and flora or to the watershed? Are the environmental protection measures included in the physical project design optimal?
- B. Economic: Do the economic costs and benefits of the project as it actually developing correspond to the project economic feasibility study? Based on available information, what will be the project's impact on small farmer incomes, productivity and food production?
- C. Social: Is the orientation program meeting its objectives? Will the social organization that is being promoted in the project form a good basis for future community or cooperative efforts? Is the ethnic settlement pattern an optimal one?
- D. Agricultural: Is the slash and burn method being used to clear land in the zone an optimal one or should other methods of land clearing be considered? Are the 50 hectare plots too large?

Subsequently, it was agreed that a review of the management system employed in project implementation was also required.

In addition to these specific points, the mission also asked questions related to the replicability of the San Julian experiment. "Should more social services be extended

to the colonists initially than is now the case? Does semi-directed colonization really mean that the GOB is only deferring required expenditures into the future and that the true cost per settler will really be much higher than it appears at present? In short, and this will be the core evaluation question, is the low-cost, semi-directed San Julian colonization model a viable and replicable one?" (La Paz 5183)

Through the Office of International Cooperation and Development of USDA, an evaluation team was formed. A DS/RAD representative acted as coordinator. Team members and their respective areas of expertise were:

Allan G. Austin, Public Administration Specialist
Roberto Castro, Agricultural Economist
Amos J. Dye, Ecologist
Eduardo Locatelli, Agronomist
Michael Nelson, Economist
Allyn Stearman, Anthropologist
Ronald V. Curtis, DSB/RAD Coordinator

During October and November, 1978, the evaluation team visited La Paz and the project sites. Each person prepared and left behind a report. The evaluation coordinator stayed on to complete a preliminary paper which attempted to summarize the principal findings and recommendations of the team. However, a socio-economic survey was in process in the San Julian area, and USAID/Bolivia requested that the final summary document not be prepared until manual tabulations of the survey results were available. In April, 1979, these tabulations appeared and a second draft was distributed in July, 1979.

This document, then, attempts to summarize the major findings and recommendations of the individual papers prepared by the evaluation team. It also incorporates, where appropriate and possible, the preliminary results of the socio-economic survey carried out in the San Julian area. It also relies on other studies related to Bolivian Development. Final responsibility for interpretation rests with author.

II. BACKGROUND

Santa Cruz, the largest city in the Oriente, was settled in 1587. Distance and ethnic distinctions kept highland and lowland cultures apart. In recent times two events spurred the central government of La Paz to colonize the sparsely inhabited East. The Chaco War resulted in a loss of 55,000 square miles; sparsely populated land for the most part but still Bolivian. Secondly, the 1952 Revolution broke up the old haciendas and distributed the land among the peasants. But it was quickly clear that more land was needed for the populations of the highlands and valleys in order to make land available to present and future generations. Thus protection of national boundaries and relief from population pressures on land provided the twin motives for colonization of the Oriente. One of the first acts was to complete the Cochabamba Santa Cruz road which completed the link between La Paz and the largest city of the Oriente.

Nelson (5) identifies four types of colonization schemes in Bolivia: (a) spontaneous, where settlers follow a logging trail or other temporary opening in virgin lands; (b) semi-directed, where the government assists with some key public investments, usually a road, but the settlers are required to make substantial investments themselves; (c) directed, where the government maintains strict control over all aspects of the scheme, and: (d) foreign, where non-native groups receive official permission to settle in a given area. Over 62,000 families have been settled on one-half million hectares of land. (4, p.5). Spontaneous settlements account for over 68 per cent of the families and 50 per cent of the land. Directed and semi-directed account for almost 30 per cent of the families and 38 per cent of the land. Foreign settlements account for only 2.3 per cent of the families but 11.4 per cent of the land.¹

Government involvement in colonization programs began in the late 50's north of La Paz in the rolling plains that fall off towards Brazil. All of these programs have suffered from overly optimistic projections of land settled, people affected, and benefits expected.

Alto Beni I was the first of the piedmont projects. Begun in the late 50's it set the pattern outlined above of overly ambitious goals and inefficient management systems that either smothered beneficiaries with government intrusions or provided too little, usually at the wrong time. Alto Beni II followed in the same area in 1963 and was a mixture of directed and spontaneous (although 'programmed' spontaneous) activities. Mistakes committed during Alto

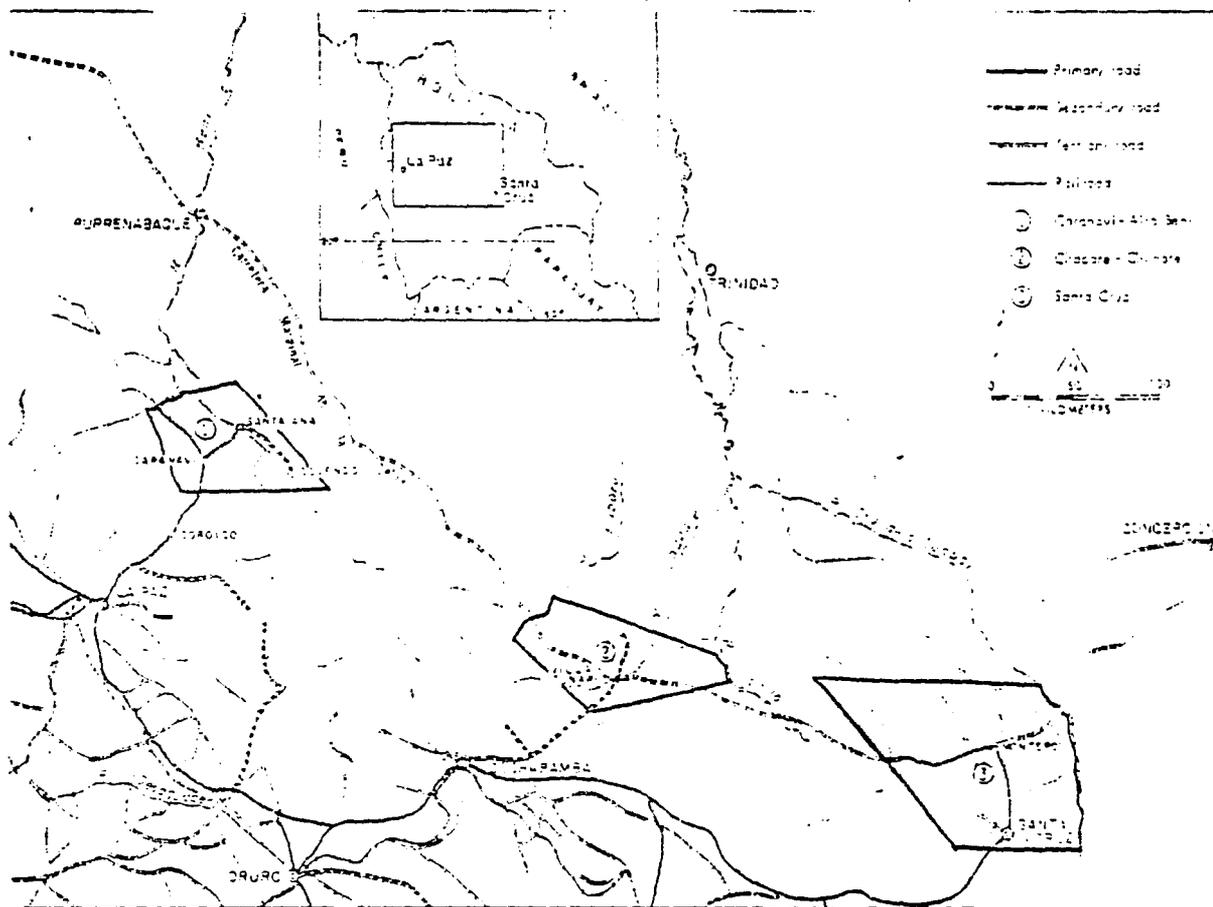
Beni I were carried forth to Beni II. Strong paternalism took the form of banning traditional campesino organizations and imposed politically pure cooperatives. Allotments were not identified before arrival and many settlers arrived during the rainy season, a time too late for planting.

At about the same time other settlement programs were being promoted in other areas, specifically, the area known as Chapare-Chimore. This project was an extension of spontaneous settlements northeast of Cochabamba. Once again the legacy of Alto Beni was present. "A series of administrative problems similar to those experienced in the Alto Beni - difficulty in coordinating the highway construction program, deficiencies in the technical evaluation of the agricultural potential of the area, and unrealistic projections of the marketability of products - made a radical adjustment necessary." (5, p. 93)

The last major area of colonization lies to the north of Santa Cruz. Started in the middle 60's it was considered to have the best chance for success due to the proximity of a paved highway leading to the Santa Cruz market. But poor soils limited intensive production possibilities and led to agricultural systems based on livestock on 50 hectare plots.

Santa Cruz is also the area of foreign settlements in the piedmont. Two Japanese settlements, at San Juan and Okinawa, were started in the period 1955-60. Supported by the Japanese and U.S. Governments, the colonies are considered successful. The map on the following page shows the major areas of colonization.

SITES OF COLONIZATION SCHEMES



1. Alto Beni I and II
2. Chapare-Chimore
3. Santa Cruz

III. THE PROJECT

The subject project is the latest in Bolivian efforts to affect colonization activity. It was conceived to assist two groups, groups defined primarily by time and method of initial settlement. The area known as Chane-Piray encompasses a group of settlers considered to be at the consolidation phase², a condition where the risks taken and the investments made during initial entry into a virgin area are leading to a more stable and productive level of development. This area was originally settled when colonists followed a road built for oil exploration. Since then, over ten years ago, more permanent production systems have been established, land markets have developed, and permanent housing is evident, much of it clustered near the main road to take advantage of stores and schools. The project is to assist in the consolidation process by funding two major activities: an 80 km. road beginning at Chane-Independencia and running to the newest areas of colonization and support services for more intensive agricultural development including agricultural credit, agricultural research and extension activities, and land titling.

The second area targeted for assistance is known as San Julian. This is a government supported colonization effort in virgin territory. Following the nomenclature of earlier efforts in colonization, San Julian is a semi-directed project. That is, while the role of the government is important, public investment is limited primarily to public goods. Money for housing, on-farm investment, and even some initial community structures such as schools must be provided by the settlers. But the project did include innovative models which went beyond the simple provision of a road. Cognizant of the limited success in other colonization efforts (some would call them failures), the project attempted to deal directly with the suspected causes of problems. Considered most important were: (1) lack of potable water; (2) illness, and; (3) the absence of familiar socio-cultural institutions in the new environment. Given these problems the project included elements to deal directly with them as well as perceived constraints to development. Thus the components for San Julian were more extensive and more directed. Financing was available for: (a) survey of the land and laying out roads, trails, and farms before the arrival of the settlers; (b) promotion of the project in the highlands, encouraging settlers from the same communities to colonize the new area; (c) establishment of sanitary posts and potable water facilities at each site plus a mobile health facility to cover the area; (d) a 100 km road and 800 km of lateral dry weather trails; (e) agricultural service center for research

and extension, agricultural credit, and land titling activities; and, (f) an orientation program for the new settlers.

The project pulled together services from eight Bolivian agencies, to be managed under the umbrella of the Operations Committee of the Instituto Nacional de Colonizacion (INC). The total cost of the Project is \$15,249,000. Table I shows the allocation of funds by project activity.

Table I
Financing by Project Components (\$000)

<u>Components</u>	AID Loan		Total Project	
	\$	%	\$	%
1. Roads	7838	81.3	8630	56.6
2. Production Services	990	10.3	1524	10.0
3. Social Services	327	3.4	670	4.4
4. Project Administration	240*	2.5	1015	6.7
5. Project Location	250	2.6	3410**	22.4
Total	9645	100.1	15249	100.1

*\$150,000 of additional grant funds financed the Land Settlement Advisor

**\$3,000,000 was for 200,000 hectares granted to the settlers.

The building of the roads takes most of the funds. Even when all project costs are tabulated, roads and land require eighty per cent of the funds. This characteristic becomes important later when replicability is discussed.

IV. ENVIRONMENT

There are at least three environmental concerns. First, is the quality of the natural resource base consistent with the type of agricultural development promoted by the project? Second, is the technology used and proposed non-destructive? Third, what are the larger scale ramifications of radically and permanently changing the landscape?

Natural Resource Base

It is widely accepted that fertile soils in the eastern part of Bolivia are scarce and widely dispersed. Project funds were provided to produce a soil map, at a broad scale of 1:250,000, by the Servicio Geologico de Bolivia (GEOBOL) which would guide future colonization attempts. The importance of such information is attested by the experience of one of the foreign colonies. Whereas neighboring colonies leave fallow only 15 per cent of their land, on average the San Juan colony leaves 50 per cent of the land fallow at any one time. As the foreign colonists share many other important characteristics, this practice appears to be followed in order to protect the fragile soils from overuse.

The land in the San Julian area appears to be productive, although the extent to which soil fertility can be maintained is still questioned. (l.c., 1978) The soils of the Chane-Piray area have been farmed successfully for longer periods but even there the efficacy of the fallow system in rejuvenating fertility has not been sufficiently tested. In any event, there is no indication at this stage that the quality of the soils is insufficient for the type of agriculture promoted in the area.

Data on rainfall are inadequate although it is clear that the northern zones receive more rainfall. Best estimates for the area appear to be between 850-900 mm in the southeastern part of the zone with about 1100 mm in the northeast. (l.c., p.2) Given our present knowledge on soil fertility and rainfall, Dye concludes that "The chosen settlement area offers abundant opportunities to implement various agricultural production strategies in order to determine which models might prove most promising in terms of increasing the nutrition and economic levels of colonists." (l.c., p.2) While not all production schemes may pan out, the quality of the resource base allows a wide range of theoretical possibilities. This opinion is supported by Locatelli where his investigation found the alluvial soils in the new area to be agronomically suitable for the present mix of crops, as well as other potential crops. (l.d.)

One high quality resource that is not being exploited within the confines of the project is timber. Harvesting timber is taking place, at great observable damage to existing roads. But concessions "...certainly covered all of the San Julian project prior to its initiation." (l.e.) The consequences are that settlers cannot cut and sell logs to augment their income, community enterprises based on timber extraction and processing are not possible, and the trees, instead of serving as a valuable resource for the settlers are a nuisance that impedes agricultural development. As Nelson concludes, "(I)f a strategy is evolved for development of the Oriente, the management of forestry is clearly an instrument which could be systematically manipulated in conjunction with roads, colonization, urban centers, etc. to achieve desired results." (l.e., pp. 33-34)

Destruction of the Environment

There is considerable and understable concern about the impact on the environment of the type of technology practiced and promoted within the project. This focusses now on the "slash and burn" technique of agricultural production practiced by colonists but the longer term implications of more modern technologies, whenever developed, has to be considered as well. The slash and burn technology takes two basic forms as practiced today. One system is purely migratory. Land is cleared and farmed until yields fall off. These used plots, usually about three hectares, are then abandoned for another virgin area where the process begins again. The land is not used again by the original settler although cattle producers are often reported to take over the land for pasture. In any event, the original settler, whether by desire or forced by circumstances, has no intention of building a stable agricultural system within one area.

The other slash and burn system, and the one clearly implied by the project, does promote stable agriculture but relies on a farming system whereby a large percentage of the farm is left in a fallow state at any one time. A farmer clears a plot, exploits it for two to three years, and then moves on to another plot. But the second, and subsequent plots, will be within the confines of his allotment. Eventually, he will return to farm the original plot which, with the passage of time, has recouped some fertility.

Whatever the system followed, a strong body of opinion exists that maintains that clearing a climax forest for farming begins a process that results in the ultimate destruction of the soil base. Agricultural production pulls

nutrients out of the soil that cannot be replaced. This, coupled with erosion, leaching, and the hard sun of the tropics, produces a soil base no longer capable of supporting the flora that once was or the agriculture to be.

Drops in yields do occur, usually within three years. But where it has been long believed that a changing composition of the soil is the primary cause of yield declines (4), Locatelli (l.d.) sees competition from weeds as the primary factor. This is supported by a mission from Centro Internacional de Agricultura Tropical (CIAT), which has not yet been able to demonstrate a response to fertilizer in cotton or corn. (l.c.)

The bottom line is that not enough is known about tropical soils. While a call for more research may seem trivial, the ultimate success of colonization in the tropics depends on more detailed information on soils. This is discussed more in the Technology Section.

But, the agricultural technology employed in the project area, however primitive, is not the only cause for concern. The removal of the climax forest, construction of roads, and agricultural production of any type begins a chain of events that, unless countered, will lead to the deterioration of the resource. While Dye (l.c.) views the most serious danger to the area as coming from wind erosion, he outlines other dangers that must be dealt with during the development of the area. (Wind erosion has been reported in another area of recent development where large tracts of land have been cleared and intensive mechanization is used. (Communication from Peacock, 1979.) Specifically, the system of wind breaks must be maintained and possibly intensified to reduce wind erosion. Protective vegetative cover of streams must be maintained to reduce runoff. And a protective cover of some kind must be maintained on the land to protect it from the harsh rays of the sun. In summary, the development of the area must, to the maximum extent possible, be consistent with natural forces at play. The construction of the road that bisects the project area is one example where nature and man are at odds. Dye reports (l.c.) that the road crosses what appears to be an old stream bed. The road will become, it is feared, an ineffective dam for seasonal runoffs. At the time of the evaluation, these problems were well known to project administration, especially the Land Settlement Advisor. But there was also little indication that an effective control system for environmental protection, to do what is already known to be necessary, has the necessary government support.

The Longer Term

Changes beyond the dramatic consequence of erosion and leaching also result from the intensive incursion of man into virgin territory. (4) Many of these changes cannot be viewed immediately or by casual inspection because of their nature or the period of observation. Climatic changes, for example, are probably occurring but because of the lack of long-term weather observations in the area, the new climate becomes the norm. A visitor to much of the project area today cannot see what has transpired to the wildlife. Much of it is no longer there. Insect populations change, the dominant species reflecting the new habitat. Loss of genetic material, in both plant and animal life, has unknown consequences. And an incalculable loss is the destruction of a work of nature that cannot be replaced. (4)

The opportunity is still there to preserve some of the unique tropical forests of Eastern Bolivia. Large stands could be set aside for future generations to decide their fate. But a law creating a forest reserve without minimal enforcement would be worse than no law at all.

V. AGRICULTURE

Technological questions dominate the problems with agriculture in the project area: agronomic recommendations, e.g., planting densities, fertilization rates, recommended pesticides, etc., and concerns about slash and burn technology are paramount. The combining of technologies to produce farming systems is discussed in the economic section.

Agronomic Recommendations

Agronomic recommendations --technological packages-- are a standard feature of agricultural development projects. The recommendations may be as simple as a change in fertilization rates for a specific crop or as complex as a completely new method of production, involving new seed, planting densities, cultivation practices, etc. For the project at hand two agricultural service centers were to service farmers in the two areas. To date essentially nothing has been done. Construction of the centers was delayed until a substantial portion of the new road was completed so that the centers could be placed towards the middle and extreme end of the road. The reason cited was to facilitate access between technicians and producers all along the intended development area. (10)

Locatelli highlighted the problems that require attention. Yields of cereal crops, rice and corn, fall significantly after three years. Traditionally the cited reason is the loss of natural fertility. But Locatelli, while accepting a loss in soil fertility as a contributing factor, sees the increased competition from weeds as the primary cause for decreased yields. And present cultivation practices, using hand labor, do little to stifle unwanted vegetation. Herbicides are clearly indicated but before a general recommendation can be made, field tests should confirm types and doses and, as important, farmers have to be schooled in the use of dangerous pesticides. (1.d) Research to support agronomic recommendation has not started yet.

Slash and Burn Technology

Slash and burn, swidden agriculture, shifting cultivation, are all names applied to the traditional practice of cutting into forest land, burning the residue, and then planting between the larger, unburned stumps.³ Neither intensive cultivation nor complete clearing is the rule. Yields fall within a few years and the producer must move to new land. This traditional practice is found throughout

the tropics and in most Latin American countries is cited as a primary cause of soil erosion and watershed destruction.

In the Bolivian Oriente environmental destruction is not considered as much of a problem primarily due to the undulating nature of the topography. Because of this relatively benign impact on the environment --or ignorance of its true impact-- slash and burn is considered to be, at a minimum, an acceptable technology for the colonized area. It should not be. Slash and burn technology should not be accepted.

The reason is not environmental - in Bolivia the practice may be relatively benign. The reason is not one of microeconomics where resources are ill used. Given the resources available to the colonist, the technology is probably optimal. The reasons relate to drudgery, returns to the farmer, and returns to society.

The notion of the pioneer hacking away at the jungle to create his farm may seem romantic to those of us observing from afar. It may even fit our conception of "an appropriate technological mix of resources given the relative abundance of labor and the shortage of capital". But it is hard, onerous, killing work. And every effort should be made to reduce the muscle power requirement.⁴

Additionally, the returns to the farmer and his family are too low. Relying on human muscle a farmer can conquer three to six hectares of land, depending on the size of his family and the availability of cash to pay hired labor. A cash yield of \$75.00 per hectare could be expected, resulting in a family income between \$225.00 and \$450.00. (4) This may well be an improvement over present living conditions for some of the colonists, but as a target income goal for a development project it is woefully low.

The final reason for rejection of slash and burn is the low return to society in general. The unutilized lands of the Oriente represent a real social cost to the people of Bolivia. A farming technology that requires 90 per cent of land to remain idle at any one time is wasteful. More jobs and more income resulting from the multiplier effect through the economy can happen only if technologies can be identified and financed that increase the utilization of land.

VI. SOCIAL ANALYSIS

Socio-Cultural Constraints.

Taking into account the experience in Bolivia in colonization schemes, the designers of the Project were aware of the need to treat with more sensitivity and incorporate more directly the social background of colonists. For the new settlers the change in environment requires more than a physical adaptation -becoming accustomed to the heat, humidity, insects, oxygen, etc.

The migrant also enters into an agreement where close kinship and familiar surroundings are exchanged for a sparsely populated world in which the inhabitants may share few of his cultural norms. Insecurity, because of the lack of supporting socio-cultural mechanisms, was thought to be a contributing factor to the disappointing performance of earlier colonization projects. (11, p. iii) Certainly socio-cultural factors had not received attention in the design of the first or second generation of colonization programs leading critics to conclude that the projects were not in tune with the desires of the migrants. (5)

To address this problem the Project incorporated an activity that attempted to maintain the socio-cultural stability evident in the highland villages of the migrants. Agreements were forged between Instituto Nacional de Colonization (INC), Servicio Nacional de Desarrollo de la Comunidad (SNDC) and Desarrollo Social y Economico (DESEC) to carry out promotional campaigns encouraging group migration. By putting together migrant groups from the same village traditional socio-cultural institutions would be maintained in the new colonies and provide a stabilizing force that could carry colonists through the difficult first years.

The response has been minimal. It has proved extremely difficult to form migrant groups from the same village.⁵ While the importance of supporting social institutions is not in question, the attempted transfer of village specific relationships which have produced a stable environment in the highlands can very easily work against the development goals of a colonization scheme. Especially critical are the cultural drives which insure redistribution of wealth within the community. In a closed peasant society the enrichment of one family is often at the expense of the others. It is at least perceived as such. (3)

Stearman describes the Cargo system as a common tool in Latin America to discourage accumulation of wealth. It revolves around village saint days and the annual fiesta.

In order to hold fiestas for the saints, food, drink, music, candles, and other paraphernalia must be provided. This, of course, takes money and/or material possessions. Each adult male begins at the bottom of a rigidly structured hierarchy by contributing small amounts of cash or crops and holding minor religious or community service offices. If he is a successful farmer, his financial assets will increase over the years and he can contribute more and more to the fiestas. As this individual moves up through the social/religious hierarchy, his wealth is redistributed to the community, but his power and prestige continue to grow. If he has been astute at managing his economic and social alliances, by the time he reaches late middle age he will be named "mayordomo" of a fiesta, a position of great status and also one which requires a major financial contribution. As an ex-mayordomo, he has achieved the pinnacle of his social/religious career in the village and may go on to become a Jilakata or civil leader as well. (l.f., pp. 8-9)

This tradeoff of capital for social prestige accomplishes what is needed in the highland villages -centuries of stability and minimization of inter-familial strife emanating from wealth differences. But in a colonization project capital is needed for productive on-farm investments. Economic development requires change in the socio-cultural institutions and common migrations from highland villages are not conducive to change. In fact, Stearman goes on to recommend that if village groups do appear, then as a matter of course, they should be separated. (l.f., p. 9)

This is not to say that cultural factors are not important. They are, emphatically so. But the mechanism for preservation of those cultural norms consistent with the new economic environment (and the evolution of new social institutions) is not to be found in the transplanting of highland villages. Rather, it appears that the way in which settlers enter into the colonization project has a lot to do with reinforcing positive cultural norms and forging new community standards. Stearman sees the Orientation Program as a ritual which provides the cohesive bond for future community solidarity.

Although it is probable that the orientation program has not been conceived or analyzed in terms of this model (rites of passage), it should be emphasized that the ritual importance of such a program is extremely significant in creating solidarity, group awareness and a sense of purpose among colonists. They have undergone a "trial by fire" and have successfully met the challenge. Frequently, when individuals are expected to make a dramatic alteration in lifestyle or pass through a particular life crisis without the benefit of ritual recognition of this experience, frustration, alienation and hostility develop. In some of the older colonies, these psychological manifestations of stress were readily apparent among many of the settlers. The orientation program then, in a purely ritual sense, is working to help overcome many of the emotional and social adjustment problems faced by the new colonist in San Julian. (l.f., p.10)

It is the orientation program that is providing the setting and the time to begin the process of adaptation of settlers' socio-cultural psyche as well as adapting to the new physical surroundings.

Ethnic Settlement Patterns

There has been a question in the minds of the program designers as to an "optimal" ethnic settlement pattern. This focus on the spatial placement of the two major ethnic groups, the highlanders (Kollas) and the lowlanders (Cambas), reflect the long standing animosity and distrust that has characterized relations between La Paz and Santa Cruz for centuries. Stearman cites ethnic (or cultural) differences to explain the dominance of the Kollas in establishing marketing centers. Kollas have a reputation for more aggressive business behavior and lowlanders, it is believed, are easily dominated if not present in large numbers. If sufficient numbers of lowlanders are present they will segregate themselves, in self defense, one presumes, from the Kollas. This, Stearman believes, "...could be detrimental to the solidarity and development of the settlement zone." (l.f., p.7)

Another long time observer of Bolivian colonization programs also comments on the ethnic conflicts evident in the Oriente. In looking at the relationship through a decidedly more global prism he reports that "(t)he increased contacts between the upland...and lowland...have led to

greater appreciation and understanding of each other's culture and has resulted in a lessening of the social and political tensions that have long existed between these different cultural groups." (4, p. 30)

These views are not necessarily conflicting. While regional mistrust can diminish due to increased contacts between the two groups, interpersonal relations will continue to reflect cultural distinctions. But operationally, this does not mean that community solidarity must transcend all ethnic distinctions. Community development can, and does, occur with several ethnic groups present. Of concern to project management should be that ethnic patterns are not allowed to develop which preclude participation by minorities, Kollas or Cambas. In terms of an "optimal" ethnic settlement pattern, there isn't one.

Role of Women

The role of women in the San Julian Project merits special consideration. Traditionally the Bolivian woman plays a very significant role in the economic life of the family. For Bolivia as a whole, sixty per cent of the women of working age are part of the labor force as opposed to 20-25 per cent in other latin countries. But in making the move to the Oriente the role of the woman changes. Stearman suggests that the Orientation Program is deficient in actively assisting women to find new, productive roles. (l.f., p.13) A tradition of productive participation in family enterprises should not be squandered in the new setting.

Women and children should participate in the Orientation program. Their special problems of adaptation to the new environment have to be addressed.

Women should be expected to participate in agricultural activities. They should be taught along with the men to handle an ax and a machete. There is no reason why they cannot take part in the rozado (bush clearing), planting, and harvesting phases. They certainly should be given gardening tasks since this frequently is the domain of the female in the highlands. Women along with men should receive instruction in cooperatives, management, agricultural technology, and marketing. In this manner, women will be given a variety of meaningful tasks directly related to subsistence activities. Their self-esteem will not be diminished and they can continue their role as aggressive participants in family activities. (l.f., p. 13)

The nutritional role of women needs to be emphasized. We must keep in mind that these highlanders are facing a drastic change in diet. The Orientation Program has the opportunity to introduce non-traditional and nutritious foods, such as soybeans, into the new diet.

VII. MANAGEMENT

Project Management

"Deficient performance on Alto Beni has been attributed to administration in both planning and execution. International advisors were naive. Land was poorly selected and crop programs were unrealistic. Centralized administration in La Paz was unresponsive to the requirements of colonists and field staff, which resulted in inappropriate programs, inefficient control, and inability to learn from experience." (Unpublished data, AID La Paz, as cited in (5, p.91) Subsequent projects suffered similar difficulties. (5: Nelson, 1974: Alto Beni II, p. 91; Chimore p. 93; Yapacani, p. 95) The designers of the San Julian and Chane-Piray project were cognizant of these administrative difficulties and incorporated a mechanism to facilitate coordination and improve over past experiences. An existing coordinating body, the Operations Committee of INC, was modified to serve as that mechanism. Representatives from the eight action agencies, under the direction of the sub-secretary of MACAG, would serve as the final forum for management. In addition a loan funded, full time project advisor would serve as the permanent conduit from the project to the Committee. It never really worked.

The failure to contract the Project Advisor explains part of the problem. In addition, pulling together eight organizations to carry out time sequenced tasks to reach a final goal is a difficult undertaking. But when the tasks are not well defined and there is some confusion about the final goal, as is the case with most development projects, then management problems grow geometrically.

But even more basic to the problem is the nature of the administrative structure that has evolved in Bolivia. "The Bolivian government's administrative system appears to have been designed primarily (perhaps not explicitly) to serve a control function. That is, the structure and style of administration tends to be organized in such a way as to guard against potential abuses of the public trust, particularly in the area of financial management." (l.a., p.1) Continuing: "(v)iewed from this perspective such common features of Bolivia's administrative landscape as the high level of centralization, the extraordinary number of officials who must sign off on expenditures, and absence of flexibility in budget execution are more understandable than might otherwise be the case." (Ibid.)

But understandable or not, one still has to contend with the realities of managing development projects, especially those where changes in human behavior -- highland inhabitant to tropical pioneer -- are critical for project success. At the beginning of the San Julian project, management was sailing an uncharted sea with a sketchy map. A map existed because of the embodied experience in INC from earlier experiences in colonization. It was sketchy because not enough effort had been made to identify the causes of successes and failures, especially the human behavioral quotient. With such a task an administrative structure that emphasizes control over flexibility flies in the face of reality. Control implies pre-knowledge, omniscience; characteristics that were decidedly not evident in the San Julian project.

It would be easy, given this characterization of the Bolivian administrative structure, to lay the blame for all difficulties at the doorstep of the Bolivian government. It would not be appropriate. At a minimum the partner in this project, AID, deserves mention. The project evaluation carried out in 1977 catalogues some of the contributions of AID. Excessive delays in approvals of contracts and work plans are typical. But the procurement of tractors for the construction of the access trails in San Julian is of a special character.

Excess property tractors were ordered from the United States without approval by INC. These tractors, built in the late 40's and 50's were to have been reconditioned to normal use standards. They were not. An agreement was made with the Bolivian Caterpillar dealer to recondition four of the five and use the fifth for parts. Initial repair estimates proved too optimistic and more money and time were required. In summary, the unilateral action by AID to buy excess property tractors caused strained relations. Delays in building the access trails in San Julian can be traced explicitly to this action. Although the tractors arrived one year after the signing of the loan agreement in September of 1975, by April, 1978, (the date of the evaluation) "...an average of two have been working normally, each with about half the output of new D8 units." (10, p.8)

The Orientation Program

The Orientation Program is the innovative and exciting happening in the Project. Designed to ameliorate the initial shock of entering a foreign environment, cultural and physical, the Program has evolved into a management device that greatly improves the odds for project success. It

increases efficiency by reducing the abandonment rate from that experienced in earlier projects, often as high as 42 per cent.⁶ Although it is still early the rate at San Julian has averaged around 20 per cent (10) with a recent low of 5 per cent. (7)

The Program increases the flow of benefits by reducing the time required for adjustment. Settlers are able to clear and plant land faster and reach the threshold of the consolodation phase sooner. And the Program reduces absolutely the human suffering associated with colonization schemes. By providing potable water and primary health care, food and instruction in food preparation, and a sense of participation in a common struggle with other pioneers, a new life begins on a much more solid and pleasant footing.

The Orientation Program, along with other Project activities, didn't begin intensive fieldwork until 1977. (10) The Program has a history beyond the San Julian Project. Created and managed by the United Church Committee (UCC), an ad hoc forum of Mennonite, Methodist, and Catholic representatives joined by the common interest in land settlement programs, the Program has its genesis in the area west of the Rio Grande, where the UCC was assisting in the resettlement of flood refugees. The present Program grew out of that experience but has been shaped into a highly organized and adaptive exercise geared toward the initial needs of settlers.⁷

The pattern that has evolved, and by all appearances is working very well, is the formation of groups of settlers from registers maintained in the Montero office of the National Colonization Institute (INC). These applicants are, for the most part, seasonal migrants who worked in the cotton and cane fields three to four months out of the year before making a decision to remain in the lowlands. This self-recruitment also lends stability to the project. Individuals with lowland experience can more properly assess the risks involved and are already familiar with the products grown and the technologies employed. First hand experience by prospective colonists has no substitute.

When the forty family group arrives at the settlement site they are greeted by a social promoter who remains for the duration of the four month course. Two tin-roofed sheds have been built for sleeping quarters as well as a communal kitchen. Two latrines and a well, with pump, are in place. Food is provided through the World Food Program with supplementary fresh foods purchased from older colonies.

With the promoter taking the lead, work schedules are established and the first leader is elected for a period of one month. This sets the stage for elections at the end of the Orientation Program when a leader is elected for one year and five or six individuals are selected to serve on the Board of Directors (Mesa Directiva). Three major projects must be completed within the four month period: clearing of nine hectares of urban area, 40 hectares of farmland cleared, and a house with a latrine built for each colonist. Clearing of farmland is done collectively and assignment of individual plots deferred until all land is cleared. During the land clearing phase an experienced highlander is employed to advise new colonists on slash and burn technology and use of tools. Afterward rice seed is provided for the first year. In addition to the primary crop, rice, cultivation of other products is encouraged and seeds and cuttings are also distributed. While many of these may have commercial value, the initial intent is to provide risk reducing alternatives to monoculture and establish a degree of self-sufficiency among the settlers.

Throughout the Orientation period staff from the UCC team visits each site for two days every other week. The staff includes a home economist (mejoradora del hogar), a nurse/paramedic, and a cooperative specialist. How cooperatives are promoted is typical of the common sense approach of the Program. A consumer cooperative is set up and managed by the colonists, with assistance from the specialist. At the end of the Orientation the cooperative is disbanded, re-established only when the colonists themselves decide to do so. To date, re-establishment has been limited. Apathy is a cited cause (the bane of consumer coops everywhere) but colonists who wish to establish their own businesses are obviously ill disposed towards community owned competition. But consumer cooperatives are not forced nor subsidized. Community support must be strong for these cooperatives to survive.

At the end of the four months a closing ceremony is held and each colonist receives a settlement certificate. While no substitute for a title the certificate does establish "rights" to the land. Assistance from the Orientation Program ceases at this point although World Food Program supplies continue for another five months.

By all observations the Orientation Program is a success. This can be said in spite of the limited life of the program and the absence of hard data. All members of the evaluation team that visited the site in late 1978 came away impressed with the Program. Table III provides additional support for this assessment.

Table III
Settler's Perceptions of Present Economic Condition (9)
(Percentage Distribution)

	<u>Better</u>	<u>Same</u>	<u>Worse</u>
One Year Settlements	70.0	18.0	12.0
Two and Three Years	32.1	35.8	32.1
More than Three Years	54.5	36.4	9.1

If we can accept a few assumptions, namely that the populations are homogeneous, weather is not a factor, and the respondents in the One Year Settlements are the only respondents that went through the polished Orientation Program (begun intensively only in 1977) then Table III does tell us that the colonists value the Program. Especially cogent is the difference between the one year settlements and the two and three year settlements. Seventy per cent of the newer (and presumably Orientation graduates) respondents think they are better off as opposed to 32.1 per cent of the two and three year veterans. The "better off" class grows to 54.5 per cent in the oldest colonies but this also reflects the defections: disgruntled colonists would have left by the fourth year.

Then the Orientation Program is achieving the goals set out in the INV-UCC agreement: (a) to help colonists adapt to a new environment; (b) to stimulate the socio-economic integration of colonists, and; (c) to promote community solidarity. How it has happened to succeed is discussed next.

The Success of the Orientation Program

Harry Peacock's influence was felt outside of the circle of the Orientation Program. He was officially the Land Settlement Advisor, a grant funded position. He was also the primary catalyst that kept the project moving and the bond that kept the project whole. He covered for the absent Project Advisor --never contracted-- and through his sensitive understanding of the Bolivian landscape, provided support for key Bolivian officials.

He helped develop the Orientation Program and undoubtedly was partially responsible for recruiting the dedicated team of foreigners and Bolivians that make up the team.

The Program Team is made up of foreigners, provided through the agreement between INC and the UCC, and Bolivian technicians, seconded from their normal duties with the INC. The quality of the team is very high and explains much of the success of the Program. Good people can be found throughout the Bolivian government yet the Orientation Program, in concept and execution, is unique. The administrative environment in which the Orientation Program operates is far different from the generalized Bolivian system which emphasizes control. And it is this difference which explains success. For "...the same features that provide for a good deal of administrative control often prove insensitive and unresponsive to the quite different demands of development." (l.a., p.2) And the administrative flexibility afforded the Orientation Team allowed them to adopt a version of what is known as the "process" approach to project development and implementation. That is, settler adaptation to a new environment was defined as the key problem. Based on available, but limited, knowledge, the problem was thought to be caused by: lack of a stable, socio-cultural base, poor health condition, and unfamiliarity with tropical products and technologies. The solution could not be simple provision of goods and services to treat the causes. Experience in prior colonization projects had demonstrated that the heavy hand of paternalism could be as deadly to colonist's hopes as polluted water.

Rather the Orientation Team had to seek that balance of assistance which kindled self-reliance while providing the basic minimum of outside resources to establish economic viability, community solidarity, and reduce human suffering. Finding this balance, and the necessary components of the Program, required continued focus on the problems while experience dictated the worthwhile and the discards. Thus the "process", the flow of experience, becomes the conduit for the solution of the problem.

The success of the Program can be attributed to these two factors: good people and an administrative enclave outside of the Bolivian bureaucracy. This has direct implications for the replicability question. Good people can be found in Bolivia. Replicability then rests on the administrative question. And it appears that process types of operations will have to be conducted outside of the normal bureaucracy.⁸

This appears to be possible. It should be noted that INC permitted the establishment of the Orientation Program outside the bureaucracy. Although some friction was reported among personnel, the continued and successful operation is due to the vision of INC leadership.

VIII. ECONOMIC ANALYSIS

Calculated economic benefits for the Land Settlement Project follow the pattern established in earlier colonization programs: results fall short of targets. But also in line with experiences, realized benefits still produce respectable internal rates of return (IRR). With the exception of Chapare, which yielded an IRR of 1 per cent, government funded projects have produced ex post IRR's ranging from 8 per cent for Alto Beni I to 24 per cent for Alto Beni II. (5) The San Julian portion of the Project appears to be producing an IRR of 20 per cent. (l.e., p.16) This very respectable rate of return is calculated on the expectation that only 2400 colonists, instead of the targeted 4230, will be settled between 1975 and 1981.

In Chane-Piray the calculation of benefits is problematic. There are 7000 expected beneficiaries in this area, but calculating ex post net benefits attributable to the Project is beyond available data sources.⁹

These high internal rates of return are confounding. One would imagine that projects with such high economic indices would have little trouble being funded. The typical set of development projects competing for the same government (or donor) funds rarely has options that promise and deliver so much. But support for colonization projects is difficult to generate. Part of the difficulty lies in what the IRR measures and the implications of this measure.

Calculation of the benefits and costs of development projects, especially colonization projects, is nicely explained by Michael Nelson in "The Development of Tropical Lands". (5, Chapter IV) The benefit side of the equation includes flow of new production that results from a project; the cost side, public and private costs. Conceptually, the calculation of total benefits should, as he points out, include not only primary economic benefits but also secondary benefits (such as employment generation) and net externalities (positive minus negative).

In addition to economic benefits, attainment of socio-political goals should also be included in the calculus. In Bolivian colonization schemes the following objectives are considered important: (8, p.9)

1. Correct the disequal distribution of rural population with regard to land resources.

2. Diversify and increase agricultural production by promoting the cultivation of tropical and subtropical crops such as rice and sugar. In turn, this would reduce food imports, diversify exports, and enhance the national income.
3. Populate frontier zones and remote areas, thus promoting their integration into the national life.

These objects are clearly a mix of primary benefits (production), secondary benefits (reduce food imports), externalities (correct man/land ratios) and political (populate frontier zones). But measurement of secondary benefits and externalities requires an economic tool that treats the whole of the economy in order to trace and measure the impact of a selected intervention. Measurement of achievement of socio-political goals, within the context of decision-making, is beyond the state of the art.

The result is a calculated Benefit/Cost ratio --or internal rate of return-- that measures only the direct economic impact. "Benefits are measured as the net addition to aggregate consumption expressed in consumer prices; that is, the (B/C) ratio reflects a pure economic efficiency criterion without regard to the recipients of benefits or bearer of costs." (5, p. 60)

By calculating the benefits in primary production terms, and requiring an 'acceptable' rate of return, two events are occurring. First, the primary beneficiary, the settler, has to absorb the total cost of the project. Not explicitly. But in order for the project to be approved, that is, for the IRR to be acceptable, he has to have a dormant productive capacity that, with the provision of project resources, will leap to the fore with sufficient alacrity, volume, and return to cover project costs. In other words, total production resulting from the activities of the settlers, minus the public and private expenditures, must be sufficiently large to cover, within a short span of time, the cost of social infrastructure provided by a project. Secondary benefits or externalities provide no contribution to bolster the IRR.

Secondly, the exclusion of socio-political benefits from the B/C calculus tends to eliminate them from the decision making process. Such goals as internal integration, populated frontiers, reduced man/land ratios in the highlands, are implicitly valued at zero or assumed costless. To include these developmental considerations in the political calculus requires an addendum to the sterile B/C ratio.

In the case of Bolivian colonization experience, this is not done to bolster a weak IRR. The rates of return, as shown above, have been more than respectable. Rather it is that the calculation of the IRR in terms of economic efficiency neglects the essence of colonization--economic and socio-political development.

In practice, "the B/C ratio is always supported by extensive qualifying remarks extolling the externalities or non-economic benefits to be derived from the project. In some cases the ratio may be accompanied by a financial analysis and cost effectiveness estimates, i.e., public expenditures per unit of the factors to be maximized, such as new employment generation, total number of beneficiaries, net foreign exchange savings,....". (5, p. 61)

The additional measure that permeates the literature on Bolivian Colonization schemes is "Cost per Beneficiary". The lower the cost, the better the package. Table I presents this measure for several Bolivian projects, including San Julian. (l.e., p. 19)

TABLE I. COST PER BENEFICIARY IN SELECTED BOLIVIAN COLONIZATION PROJECTS.

COLONIZATION PROJECT	Cost per Family (\$ 1975)		
	Roads	Other	Total
San Julian (1968 starting date)	2,000	2,000	4,000
San Julian (1975 starting date)	2,400	1,800	4,200
Alto Beni I	4,100	5,700	9,800
Alto Beni II	300	2,200	2,500
Chimore	6,300	2,500	8,800
Yapacani	3,600	1,700	5,300

The total cost per family in San Julian (1975) is \$4,200. Only Alto Beni II had a lower cost per family and this is due to utilization of a trunk highway built for Alto Beni I. (5, p.90) This also explains the high IRR noted above.

But this measure suffers a similar defect noted in the IRR. Project costs are contraposed against benefits within the Project and do not take into account benefits that spill over Project boundaries. In this case, the number of people settled within the Project is the measure. The reduced land/man ratio in the highlands, for example, is not taken into account.

An additional weakness of the "accounting" type measure is that it is virtually useless unless compared against the same measure of a competing project. Is there another project available that is cheaper in settling highland migrants? Are there alternative uses of public funds that will reduce the dependency on food imports at a lower cost? Simply citing a cost figure in isolation may provide some sense of the cost magnitudes of a project but without similar comparative measurements no rules of thumb can be developed for decision making.

For example, a possible comparable measure could be the cost of a workplace. Consider that the figures cited above (\$4,200) provide constant employment for a family of five at an expected level of income. What would be the comparable cost of a workplace in the industrial sector for the same family? What would be the cost of achieving the same income for the same family, in agriculture, in the highlands? Only when these comparative tests can be performed, for the whole range of goals implicit in one project, can well-informed decisions be made about cost effectiveness. Statements that colonization projects are too expensive when neither the goals sought nor the alternatives available are explicitly considered are at best uninformed opinion.

The calculation of the IRR representing exclusively economic efficiency within the project confines and the use of accounting measures devoid of comparative contact results in a very conservative strategy for development. It states that rural development shall proceed only to the extent that isolated parts are able to carry (conceptually) the cost. It is a "cash and carry" philosophy. Projects shall be funded only if the flow of their benefits exceeds costs by a sufficient margin to cover the opportunity cost of the capital, independent of linkages to other development activities. And this includes the provisions of services, such as education, health, research and extension, and roads that are commonly expected of modern societies and certainly the objective of developing nations. The payoff for these services cannot be measured on an individual basis. All have economic and social payoff for society at large.

That colonization does contribute to national development goals is increasingly evident. Ray Henkel, a long time observer of Bolivian Oriente notes, for example, "...the lessening of social and political tensions". (4, p. 30) Food production, in both quantity and diversity, has increased. Sugar, rice, and cotton are important crops with the accompanying agroindustrial development. Primarily through import substitution, this production has improved the balance of payment.

Farm Size

The settler and his family are the primary sources of labor and power for the transformation of a tropical forest to productive farms. This labor force is limited, often limited to one person in the first year, as the colonist leaves his family behind until some production can be assured. Table II shows Household size by age of settlement. (9)

Table II

Percentage Distribution of Household Size
by Age of Settlement in San Julian

	1 person	2-4 people	5+ people
One Year	30.7	47.6	21.7
Two and Three Years	25.0	44.7	30.3
More than Three Years	10.5	33.3	56.2

With limited family labor the settler has to rely on hired labor if the cultivated area is to be expanded. The Project included a small fund (\$500,000) for agricultural production loans to be channeled through the Banco Agricola de Bolivia (BAB). At the time of the evaluation less than \$100,000 has been disbursed. The Bank attempted to apply lending criteria for loans that clearly were inappropriate for the economic status of the colonists and the intent of the Project. Only after several years and much discussion have lending criteria been agreed upon that allow some credit to flow to some borrowers. Even with that only fifteen per cent of all farms surveyed reported receiving credit. (9) It is still not clear that BAB can adopt a lending posture that would allow timely disbursement of loan funds.

Development of the farms, measured in part by the rate of expansion of cultivated land, is undoubtedly constrained by the lack of capital. This constraint goes beyond the need for hired labor for land clearing or annual crop production. Development capital is sorely needed to increase on-farm investment to establish a stronger and more productive base for various farming enterprises. Cattle appears to be the only longer term investment that is being made by settlers and this occurs only on farms that have existed for more than three years. (9) Permanent tree crops, an ecologically sound and, if markets warrant, profitable small farmer activity, are not unknown but commercially sized lots, even half-hectare, are rare. The primary use of the land is in annual crops.

Table III

Land Utilization by Age of Settlement in San Julian
(Hectares)

	Annuals	Other	Undeveloped
One Year	1.4	0.2	48.4
Two and Three Years	2.3	0.4	47.3
More than Three	3.2	3.8*	43.0

*2.1 Hectares in improved pasture; 0.6 hectares in natural pasture. Only settlements more than three years old report cattle.

These low rates of utilization can be explained by the short passage of time. But the broader question of the appropriate size of allotment has to be raised. No one is suggesting a larger allotment. But discussion of a smaller allotment has to take place.

It is not clear why fifty hectares became the basic allotment. Equity concerns, attempting to match the allotments received by foreign colonists, may have played a role. Also, fifty hectares was cited as a key factor in explaining the success of the foreigners: the ten to twenty hectares found on the average farm in the spontaneous settlements "...is insufficient land to either establish viable systems of agriculture based on ecologically sound long-fallow methods of shifting cultivation or more intensive agriculture based on the use of fossil fuels, labor saving machinery, and other technological inputs." (4, p.33) The state of the art supports neither of these contentions. The

length of an acceptable long-fallow system is not known. Based on present utilization rates, using traditional practices, fifty hectares allows a fallow period of approximately 24 years (5+ hectares cultivated for 3 years).

More intensive agricultural systems are clearly viable on smaller farms. This is the case in Bolivia in the valleys and throughout the developing world. What kind of intensive system is appropriate for the farms in the Bolivian Oriente must be examined. And the primary question to be addressed in this research is: how much money can be generated for the farm family? One standard by which to measure is the farms of the foreign colonies.

Table IV

Gross Earnings in Selected Colonies*

	Family	Per Hectare	Hectares Cultivated
Foreign			
Okinawan	2960.00	134.50	22
Japanese	2280.00	126.60	18
Mennonite	1975.00	122.20	16
Bolivian			
Chapare	660.00	110.00	6
Yapacani	330.00	55.00	6
Chane-Piray	1026.00	85.50	12

* (4, p.19)

While these figures are not strictly comparable (production costs are likely to take a larger percentage of the foreign production systems than the traditional systems employed by on the Bolivian farms) we can say that the foreign farms are more productive. The point of the comparison is not, however, to highlight the difference in productivity. But rather to ask the question, Why? Why are the foreign colonists able to cultivate more land? Why do they receive a higher yield per hectare? Is it more capital? More experience? Are the lessons transferable? And if the more productive farming systems are within the grasp of the new Bolivian farmers, then how much land should the government grant? To put it another way, what is the target income of the development program? Given the target income and some idea of the monetary yield of available farming systems then the size of the land allotment can be determined.

The social cost of a fifty hectare allotment, if a twenty-five hectare allotment would produce an acceptable

income, is very high. Given the fixed investment cost of roads, the most expensive component of colonization, the cost per family settled could be almost halved by doubling the number of families in each colony. This alone is a powerful argument for reconsidering present policy.

IX. CONSOLIDATION AND REPLICATION

The realization of benefits, especially by the settlers, is not assured. There is a history in the Oriente, once they have access to land, to become trapped in a labor intensive farming system that produces little income. (4, p.32; 8, p. 72) In many cases the efforts of the colonists provide no more than cheap labor for land clearing for large cattle interests. As soon as the weeds drive the farmer to another plot of virgin land, a rancher buys his 'rights' to the cleared portion. (l.f., p. 15)

There are two primary economic factors that must be addressed for farm development: access to markets and productive technologies. Credit, while important, is unproductive unless linked to these two.

Markets

Sugar production in Chane-Piray no longer has the importance reported in Royden and Wennergren. Migrant farmers were able to enter this lucrative market when world sugar prices were high and the mills were buying all available supplies. With the drop in world prices only farmers with assigned quotas from the mill are still harvesting. (l.b., p. 10)

Markets --world, national, regional, local-- are basic to agricultural production programs. Markets will determine the income earned by colonists. They are a sine qua non for consolidation. And while efforts to improve efficiencies in the marketing system for present crops, especially where producers can control part of the marketing chain, should continue, expansion of the market should receive equal treatment. For smaller producers real income gains are to be made from production of high value crops rather than from cereals. But the risk from typical higher valued crops is insupportable without strong market connections. Construction of roads and bridges will do more to strengthen market connections than any other activity.

Productive Technologies

Traditional agricultural research around the world focusses on specific crops and on specific phases of the growing cycle. Fertilizer response trials, variety tests, selection for resistance to disease, are common expressions of research in a quest for higher and more stable yields. This is important research for development projects. And it is the style of research expected from this project.

But the value of such research, if the agronomic recommendations that result are limited to specific practices of specific crops, is questionable when dealing with smaller producers. Claims that such research is neutral to scale, (that is, the yield increase occurs regardless of size of planting), are not strictly true. The quality of resources required and unequal access to product and factor markets result in inequalities of benefits. Commercial farming experience that can translate and incorporate the information from the agriculture/extension system into a farming operation has to be embodied in the producer.

In order to truly make this type of information neutral to the size of farmer, or biased for small farmers, research must focus on the integrated farming system, not only on specific crops. The total farm, examining alternative technologies and the concomitant use of available resources, must be the focal point. In this way the State, through research programs, absorbs some of the learning costs of new farming systems and shortens the time for ultimate development for the colonists. It provides a "general equilibrium" test for specific crop recommendations. A new seed that promises higher yields but requires more fertilizer and water may not look so promising when the required water would reduce production of another crop. By beginning with these farms, research personnel are forced to channel their work to reflect the local environment. The use of animal power, common in some farms, should be an important topic of research. (l.b., pp. 26-28)

Agriculture

This total farm concept is not, according to available evidence, part of the research plans of the agricultural Research Centers. It is being addressed to some degree by the Orientation Program. Colonists are encouraged not to specialize in one crop and are provided with seed for vegetables and cutting for fruit trees. But the stimulus for these actions is more for reduction of risk, increasing self sufficiency for the family in case of crop failure.

Stable, productive farms will result in the project area only when viable production alternatives are readily available. The role of research is to speed up the development process of whole farm production systems and increase the likelihood that the newer, smaller producers with the project will be able to adopt such systems.

Replication

The concerns most often expressed for replication of colonization projects rest on the high cost per family. This has been the case for San Julian. The implication of this measure is that fewer families can be accommodated via this type of development project than with other, less expensive interventions. There are two major difficulties with this argument.

First, what is being purchased with the high per family cost? In the case of San Julian the IRR states that the investment made will yield approximately 20 per cent per annum, a respectable rate of return. If economic yield were the sole criteria, the high family cost contraposed against this IRR would be justified. Below this global measure of economic benefit it appears that the Project, with per family costs of about \$4,200, is providing the seed capital necessary for ultimate economic self sufficiency for the participants. If settlers are able to continue and achieve only the modest income gains inherent in the slash and burn technology, this is a small investment for even a small return.

Secondly, of the \$4,200 per family cost, \$2,400 represents the cost of road building. The roads belong to everyone. They are not built for the exclusive use of Project beneficiaries. The timber industry benefits through lower cost of extraction. Private traders and millers benefit by savings in time and wear and tear on trucks. Consumers benefit by larger and cheaper supplies of produce. With everyone else benefiting --the externalities not captured by the IRR-- why should the settlers be charged the full cost of road construction? The obvious answer is that they should not.

So the high per family cost has to be re-examined before a case can be made against replicability. Especially important is the realization of benefits flowing to non-project beneficiaries in the Bolivian society. And given the flow of these benefits, adjustments in cost allocation have to be made accordingly.

The other salient factor in the case for replicability is the experience acquired by the INC via the Orientation Program. There has been a quantum jump in knowledge in how to smooth the transition from highland to lowland farmer. The heavy paternalism of earlier projects has been replaced by a realization that settlers have to take command of their own participation in colonization. The physical and

cultural hardships experienced by earlier settlers are being lessened by careful site preparation and intensive training the the art of survival. The result is a low cost orientation program that goes a long way to increasing the likelihood that settlers will be able to remain at new home site and develop viable communities. This model, amended to reflect lessons learned, is available and suitable for replication.

NOTES

1. Ibid

2. Michael Nelson, In his book, "THE DEVELOPMENT OF TROPICAL LANDS: POLICY ISSUES IN LATIN AMERICA" describes the three stages of development for colonization programs. Annex A gives the full definitions of these phases.

3. The amount of land actually available for planting is usually smaller than nominal boundary measurements indicate. Locatelli estimated that stumps and residue in the San Julian area reduced available land by 25 per cent. (Locatelli, 1978)

4. This is being done in the San Julian area. A true innovation has been the introduction of chain saws.

5. Gordon N. Keller and Percy Aikens. "Socio-Cultural Factors in Colonization in Bolivia", Utah State University, La Paz, 14/74

6. Bolivia, Instituto Nacional De Colonizacion, Programa de Colonizacion INC-BID, Informe Final (La Paz, 1970: pp. 30-32) as reported in (Henkel, 1978)

7. Taken primarily from the paper by Stearman which includes a very good detailed description of the Orientation Program. (Stearman, 1978: pp.2-5)

8. The Bolivian bureaucracy is not unique in this regard. Strong questions have been raised within AID about the "process" approach with some stating that it violates a legislative design requirement, 611a, and therefore cannot be employed.

9. At present there is no available information which would indicate that rates of return calculated to hypothetical government expenditures, including roads construction, water supply, and education and health programs, is inappropriate. ("The Impact of Access Roads on Spontaneous Colonization", Thomas C. Royden and E. Boyd Wennergren, Utah State University, 1973.)

10. Proyecto de Colonizacion Puerto Villarace-Km 21, Chane-Piray. Ampliacion de San Julian, Vol.I. (La Paz: 1974) as cited in Hankel, 1978: p. 19)

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