LAND SETTLEMENT IN NORTHEAST BRAZIL

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A STUDY OF SEVEN PROJECTS

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by

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A B S T R A C T

Agricultural colonization through the establishment of planned land settlement projects is one of the principal methods chosen by the Government of Brazil for carrying out the national program of land redistribution and agrarian reform.

This study examines seven major colonization projects in one of the country's "agrarian reform priority areas", the coastal region of the Northeast. The purpose of the study is to inquire into the principal causes of the success and failures of the projects studied, and to provide a basis for the formulation of more reliable planning criteria and implementation procedures for future colonization activities to be carried out in this region.

A model is established which embodies the principal government objectives for planned land settlement, and which provides the common terms of reference against which projects are assessed. The achievement of an annual minimum income of U.S.$1,508 per settler family is considered basic to the realization of all other objectives. Seven projects are considered. Camaratuba, in the State of Paraiba; Cabo, Vitoria, Tiriri, and Rio Bonito, in the State of Pernambuco; Pindorama, in the State of Alagoas; and Treze, in the State of Sergipe. Data were obtained from interviews of a total sample of 152 settler families and from interviews with administrative personnel and from other sources. Each colony is treated descriptively, giving consideration to its history and development, and to the conditions and economic opportunities existing at the time of the survey. The field survey was conducted during the early part of 1970.

The study concludes that although there is some evidence of modest progress toward the achievement of basic settlement objectives, projects have fallen considerably short of expectations. The majority of settlers are unable to attain the income target implied by the investments made on their behalf. Basic constraints are identified, showing that higher levels of achievement are prevented by the persistence within projects of largely traditional agricultural conditions.

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The analyses, commentaries, and propositions presented in this dissertation are those of the author, and are not necessarily shared by the individuals and organizations that have been cited. The author also accepts sole responsibility for whatever shortcomings the study may have.

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I

INTRODUCTION

Notwithstanding isolated examples of success in tropical land settlement, the outcome of such development efforts, for the most part, has been disappointing. The recent experience of Brazil in the creation of frontier agricultural colonies and in the establishment of new settlement projects in the hinterland of large urban centers, unfortunately provides few if any of the sought-for exceptions.

With the creation of GERAN[1] and renewed interest on the part of the Government of Brazil to effect long overdue social and economic changes in the sugar zone of Northeast Brazil, plans for land redistribution have invoked wide-spread criticism, and have once again brought into prominence many critical issues concerning the viability and appropriateness of parcelization[2] as part of a regional reform and development plan.

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[1] In August of 1966, the Government of Brazil created GERAN, the Special Group for the Modernization of the Northeast Sugar Agro-Industry (Grupo Especial para Racionalização da Agroindústria Canavieira do Nordeste). GERAN's broad development mandate includes the modernization of the sugar industry, the diversification of agriculture, and the modification of the region's agrarian structure through land reform. The land reform program envisages the expropriation of 320,000 hectares of land from sugar interests for redistribution among 17,000 sugar workers displaced by the modernization process. Between 1971 and 1980, 88 new colonies are to be established under this program. The first project, the Núcleo de Recolonização 31 de Março, was inaugurated on March 31,1971, the anniversary of the 1964 Revolution. (Because of early organizational difficulties, GERAN did not become functional until February of 1969).

[2] The division of expropriated or public land into parcels for the purpose of settling landless rural families.

The availability of cheap land, favourable physical conditions, a well-developed infrastructure, large urban markets for a wide range of farm products which can be locally produced, and the existence of a workable mechanism for the acquisition and transfer of land, are thought of as predisposing factors to the establishment of successful smallholder settlements in this area. Militating against such optimism, however, is the marginal performance of most of the settlement projects established in this region over the past two decades. These projects were planned with equally high hopes for success, and were to benefit from many of the same regional advantages which sustain the expectations of present-day planners. While the marginal outcome of earlier settlement efforts does not provide adequate cause to vitiate colonization as a means of land redistribution and of establishing new farmers, it does urge caution, and raises many questions about the shortcomings and missing elements of past projects

The research which is the subject of this dissertation grew out of the author's travels in Northeast Brazil in the summer of 1969 and efforts to gain first-hand impressions about the agriculture of the region. A study on colonization first suggested itself as the result of visits to several settlement projects in the states of Paraíba, Pernambuco, and Alagoas, and the observation that, despite large government investments, settlers in these colonies did not seem to fare much better materially than tenants, sharecroppers, and other small farmers in the surrounding areas. Recent government plans for the establishment of eighty-eight new colonies under the GERAN program, and the author's futile search

for information about previous studies on colonization in Northeast Brazil further pointed to the need for research on this subject[3]. The idea finally came to fruition toward the end of 1969, through the author's collaboration with the Northeast Area Office of the United States Agency for International Development (USAID/Brazil), which was providing financial and technical assistance to GERAN, and which recognized the urgent need for research on colonization.

The objective of this research was to inquire into the underlying causes of both success and failure of a number of representative and well-established settlement projects in the coastal region of Northeast Brazil, and to provide an empirical basis for the formulation of more reliable planning criteria and implementation procedures for future land reform and colonization activities in this region. Because of the paucity of available data and of previous research, the study was of necessity fact-finding, aiming at the identification and analysis of major problems in land settlement, rather than the testing of specific hypotheses or the elaboration of theories. To achieve this general research objective, the inquiry focused upon the characteristics and performance of the settlement as a social, economic, and administrative unit, and upon the individual settler, his past and present socio-economic status, and his achievement in the light of the economic opportunities presented to him.

The survey was limited to seven major settlement projects selected

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[3]Northeast Brazil has a total of 59 settlement projects, involving 851,949 hectares of land and nearly 20,000 families. Most of these projects were established over the last two decades. Except for a few reports by SUDENE, any form of systematic research has been conspicuously absent.

from a total of eleven colonies located within the humid coastal zone of the states of Paraíba, Pernambuco, Alagoas, and Sergipe (Fig.1, Table1)[4]. Data were collected during the months of February through July of 1970. Data gathering included detailed interviews with 152 settlers, and interviews with technicians, administrators, and planners of different colonization and government agencies. To the extent available and relevant, the study has also drawn upon the records of colonization agencies, published government reports, as well as various A.I.D. documents.

The thesis is divided into eleven chapters. Chapter two contains a brief description of the environment and setting of the coastal region of Northeast Brazil. Chapter three gives a short historical account of agricultural colonization in Brazil and of the development of settlement laws and procedures. The chapter also deals with Brazil's agrarian reform law as it relates to land division and resettlement. The last part of chapter three is devoted to a brief review of several pertinent studies and papers which have dealt with various aspects of land reform and colonization in Brazil. Chapter four outlines in greater detail the research methodology employed in this study. Principal government objectives in land settlement are identified and serve as a basis for project evaluation.

Chapters five to ten deal with the seven colonies which were the subject of this research. Each chapter begins with an account of the history and development of the project. This is followed by a discussion of conditions found at the time of the survey with respect to project

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[4]All of these colonies are located within GERAN's area of jurisdiction.

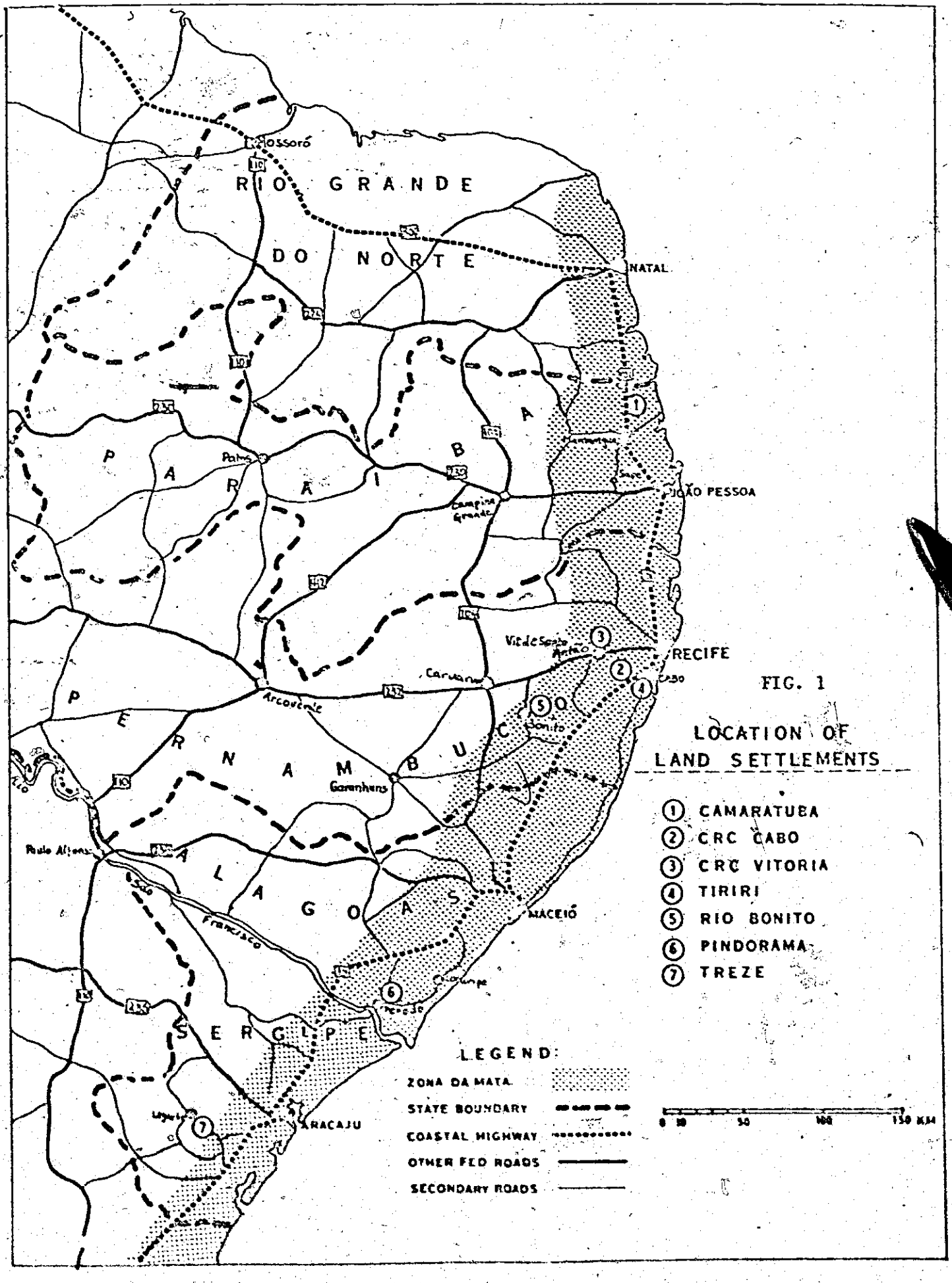

FIG. 1

LOCATION OF LAND SETTLEMENTS

1. CAMARATUBA
2. CRC CABO
3. CRC VITORIA
4. TIRIRI
5. RIO BONITO
6. PINDORAMA
7. TREZE

TABLE 1

PROJECT PROFILES

Name of Colony	Location	Date Established	Founding Agency	Present Agency	Total Area	No. of Families	Plot Size
Colonia Agrícola Camaratuba	Mamanguape, Paraíba	1936	State Government	Same	6,510 ha	64	10ha
Núcleo Colonial do Cabo	Cabo Pernambuco	1961	CRC [1] State Government	Same	3,326 ha	322	10ha
Núcleo Colonial de Vitória	Vitória Pernambuco	1961	CRC State Government	Same	603 ha	53	10ha
Colonia do Rio Bonito	Bonito Pernambuco	1956	INIC [2]	INCRA[3]	1,379 ha	33	12.5ha to 25.5ha
Cooperativa Agrícola de Tiriri	Cabo Pernambuco	1963	SUDENE	State Govt.	4,136 ha	282	10ha
Cooperativa de Colonização Agrícola de Pindorama	Coruripe, Alagoas	1954	Companhia Progresso Rural (Private)	Cooperative of Pindorama	34,000 ha	450	10ha to 25ha
Cooperativa Mista dos Agricultores do Treze Ltda.	Lagarto, Sergipe	1961	Bank of Brazil	Cooperative of Treze	3,340 ha	270	8ha

1 - Companhia de Revenda e Colonização. 2 - Instituto Nacional de Imigração e Colonização.

3 - Instituto Nacional de Colonização e Reforma Agraria.

management, the quality and quantity of services available to settlers, agricultural practices and activities of settlers, and their capital and income position. Each chapter ends with a brief conclusion and a table in which major project characteristics are outlined on a topical basis.

Chapter five describes the oldest of the seven projects, the Colony of Camaratuba, a state government project near Mamanguape, Paraíba. The first part of chapter six is devoted to a discussion of the Companhia de Revenda e Colonização (CRC), the State of Pernambuco Colonization Agency. This is followed by a description of two CRC projects, the Colony of Cabo, and the Colony and Cooperative of Vitória. Chapter seven deals with SUDENE's ill-fated attempt to establish a collective type sugar cane grower cooperative on the engenho[5] Tiriri, near Cabo in the State of Pernambuco. The Colony of Rio Bonito, also in Pernambuco, which was established by the now defunct National Institute of Immigration and Colonization (INIC), and which was partially settled with Japanese immigrants, is the subject of chapter eight. Chapter nine deals with Pindorama in the State of Alagoas, a privately sponsored project, and also one of the largest and most costly settlement undertakings in Northeast Brazil. Chapter ten is devoted to a study of the Colony and Cooperative of Treze, in the State of Sergipe. Chapter eleven provides an evaluation of the principal achievement of projects, while chapter twelve analyzes the nature of constraints confronting settlers. The last chapter presents major research findings and outlines the principal conclusions.

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[5] land holding, in the N.E. sugar zone usually part of a sugar estate.

II

THE ZONA DA MATA: ENVIRONMENT AND HISTORICAL SETTING[1]

2.1 Physiography

The Zona da Mata or forest zone of the coastal region of Northeast Brazil, is one of several, relatively distinct ecological regions of the Northeast.

Varying in width from fifty to one hundred kilometers, the region forms a long, irregular belt along the Atlantic seaboard, and extends southward for over one thousand kilometers, from the State of Rio Grande do Norte to the State of Minas Gerais. The bulk of the region lies in Paraíba, Pernambuco, and Alagoas (cf. Fig.1 Chapter I). In all three states, much of the area is dominated by extensive sugar plantations, and only occasional remnants of mata remind one of the once dense tropical forest from which the region derived its name. In the states of Rio Grande do Norte, Sergipe, Bahia, and Minas Gerais, the Zona da Mata is in most parts less than forty kilometers in width, and is characterized by extensive tabuleiros (table lands) and by generally less favourable edaphic conditions. Sugar cane is produced in all four states, but is confined to a few broad and fertile valleys lying between the tabuleiros.

The western inland limit of the Zona da Mata varies with the presence of the east-facing upland escarpment known from state to state

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[1] Most of this account is based upon research by staff of the U.S.A.I.D. Mission in Recife, to which the author also contributed.

by the local names of Serra do Espêlho, the Borborema, and the Serra das Russas. The two hundred meter contour line is considered to be the upper limit of the ecological Zona da Mata, although similar climatic features do occur as high as six hundred meters in certain favourable locations.

Beyond the fairly well-demarcated western limits of the Zona da Mata lies the Agreste, which is a narrow transition zone. The Agreste still comes under the influence of the coastal climate, and has a similar rainfall regime, but total annual precipitation is less, and is less reliable. The area has many large fazendas. However, a larger proportion of the land than in the Zona da Mata is held by small farmers or minifundistas. The agriculture of the Agreste is characterized by the production of such crops as beans, corn, manioc, coffee, pineapple, and sisal as well by livestock production.

Further westward, and adjoining the Agreste, lies the Sertão, the vast semi-arid interior, which has become infamous for its recurring droughts and the tides of human misery which follow them. Agriculture in this regions is precarious, although in good years the better land will support such crops as sisal, arboreal cotton, and a variety of subsistence crops.

In the Zona da Mata, old crystalline rocks form much of the surface. Sedimentary formations make up the lesser part. Both are deeply weathered. The littoral fringe is a longitudinal succession of alluvial deposits of fine clays and silts and long, sweeping sandy

beaches, backed by dunes as well as the dissected crystalline and sedimentary hills and table lands on the inland side. Planed surfaces of considerable extension in sedimentary areas (tabuleiros) and of lesser size in crystalline areas (chãs) are mixed with rounded hills, particularly in the northern half of Pernambuco and in much of Alagoas. Until recently, most of these surfaces were considered unsuitable for agriculture. Further inland, the hills become steeper and higher, and merge with the mountainous escarpment which forms the western limit.

Climatically, the Zona da Mata is situated south of the zone of converging inter-tropical air, limiting rainfall to convectional activities during the high sun or summer season, between the months of October and February. The major share of rain arrives from March through September, as south Atlantic Polar air masses slowly move northward, weakening as they go, but remaining sufficiently moist and cold to produce frontal rainstorms over much of the Northeast, including the interior. When these storms are delayed beyond the middle of March, crippling droughts occur in the Sertão. Because convectional activities continue along the coast, the Zona da Mata is relatively little affected by these climatic irregularities.

Coastal annual rainfall in many parts exceeds 1,500 mm (60 inches). Inland rainfall totals, near the western limits of the region fall bellow 1,000 mm, and range from 400 to 800 mm in the Agreste to less than 400 mm in the Sertão (cf. Table A 17, Appendix).

The impact of the warm and rainy climate over millions of years has not only resulted in a varied landscape, but has also deeply weathered

the surface rocks to depth of more than twenty meters. Soils are, in consequence, high in clays, especially in the lower horizons, and low in several critical soil minerals. Except for varzea (bottom land) soils and a variety of unclassified alluvial and littoral soils, they nearly all belong to the Latosolic group, common to the wet tropics. The tabuleiro soils are normally coarse, infertile, and excessively drained sands, while the chãs have clay soils characterized by poor internal drainage.

The land, once cleared of its forest vegetation, in time declined in fertility, forcing sugar cane growers to clear new land for planting. Eventually, all lower hill slopes were cleared and planted, and after some years of cultivation, were permitted to revert to forest or brush for several years and often decades. Higher slopes were then cleared and put into crops, often leading to severe erosion, the silting up of streams, and the deterioration of drainage in the normally more productive valley lands.

The mixed tropical forest or mata is the climax vegetation on well drained slopes. A similar type of vegetation was also found on the clay soils of the chãs. It is normally very dense, inter-laced with vines and spindly trees, over which tower the massive hardwood species, with large billowing tops. Much of the forest in the Zona da Mata has been destroyed in the early exploitation of timber, both for domestic use and export, in four centuries of land clearing to make room for sugar cane, and in cutting firewood to feed the boilers of sugar mills and locomotives. In more recent times, repeated attempts have been

made to encourage reforestation of the less productive land and of steep slopes. Widespread interest on the part of land owners to support such efforts is still lacking.

2.2 Historical Setting

For more than four centuries, the development of the Northeast coastal region has been closely tied to the production and export of sugar.

By 1526, Brazilian sugar was paying custom fees at Lisbon, and by the end of the century had become a source of immense wealth for the new colony.[2] Pernambuco had sixty-six *engenhos* (plantations and mills), and over four thousand African slaves in 1583. The *senhores de engenho* and their families, owners of vast plantations and scores of slaves, lived with an opulence matched only by the Court.

In 1630 the Northeast coast was briefly invaded and occupied by the Dutch, who subsequently rebuilt the *engenhos* that had been destroyed in the conquest. At the retreat of the Dutch, in 1645, the Northeast sugar economy temporarily suffered one of the many recurring crises which have characterized the industry to the present day. A severe crisis occurred again in the 18th century, when the more efficient Dutch and British undercut Brazilian production and captured its European markets.

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[2] Pessoa de Queiroz, Ricardo, *A Agro-Industria Açucareira na Atual Conjuntura*, Cooperativa dos Produtores de Açucar e Alcool de Pernambuco, Recife, 28 de Janeiro de 1970, p. 1.

In those parts of the Zona da Mata where sugar cane had not taken root, cattle grazing on large fazendas became an important activity. As frontier settlements gradually moved inland, this agricultural pattern became firmly entrenched, eventually dominating the interior.

Food crops, cultivated mainly by slaves, consisted of manioc, and of other New World and African tubers, and of beans. Habits of diet developed during these early days have endured to the present, and represent one of the many persistent obstacles to development in the Zona da Mata.

The settlement pattern was sparse. Sugar plantations clustered together around Olinda in Pernambuco and Salvador in Bahia, and from these areas spread to more outlying areas. There was a constant battle against the loss of labour, which in the early days fled to the southern gold and diamond fields, later to coffee plantations, and still later to the rubber plantations of Amazonas. Crossroad communities, where cattle were traded and villages founded by runaway slaves, grew up distant from the sugar engenhos.

The modern Northeast sugar industry postdates the opening of the national period and the abolition of slavery, both of which occurred in the 1880's. The production unit had been based upon the engenho. It consisted of a cane crushing mill, a wood-fired evaporation and processing plant, and of the surrounding plantation. Slaves planted and harvested the cane, operated the mills and provided the manpower for the enter-

prise. Oxen and mules hauled the cane and powered the mill. The product was a coarse, light brown, granular sugar.

Originally, the Portuguese provided the seed capital. Later the Dutch, who controlled the European market, made loans for the expansion of production in the Northeast. However, with the opening up of production in the Carribean, the Dutch lost interest in Northeast Brazil, and shifted their investment to the new area. As a result of competition from the Carribean and the drying up of sources of outside capital, the eighteenth century was a long depression to the sugar industry of the Northeast. Although, with the Napoleonic wars came a resurgence of markets and prices which sustained a new sugar cycle lasting well into the nineteenth century.

The advent of the steam-powered sugar mill (usina) and the centrifuge sugar refining process during the second half of the nineteenth century, made the old engenho obsolete. Toward the end of the century and the early decades of the next, unable to compete with the new mills, engenho after engenho sold out to a new breed of sugar industrialists.[3]

While modernization of industrial processes brought many innovations, in the field virtually all of the old planting and harvesting practices persisted into the new era. No fertilizer was used. There were problems of declining fertility, soil erosion, insects and diseases, and others for which no solutions were sought or attempted.

The first three decades of the twentieth century brought new crises to the Northeast sugar industry, but also saw the expansion of domestic markets, the establishment of more usinas, and a general

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[3]The term engenho is still used throughout the N.E. sugar zone. Also, in most cases the names and boundaries of the original engenhos have remained intact.

increase in total sugar production in the region.

As sugar surpluses grew, the government was forced to decree quotas to limit the output of individual sugar mills. In 1933, the Sugar and Alcohol Institute (IAA) was created to stabilize production and prices and to promote the use of alcohol as engine fuel. The internal sugar market, at prices above world levels, was safeguarded for the Brazilian industry. The industry, particularly that of the Zona da Mata, became once more complacent in the belief that the future, this time based on a protected internal market, was secure. During this period, the last of the traditional engenhos disappeared, and a new group of independent cane growers or fornecedores de cana began to assert themselves. Laws were decreed protecting the fornecedor from absorption by the usinas, by requiring that the latter limit their cane production to half their needs, the other half to be purchased from cane growers.

Throughout World War II, Brazil's sugar production remained stable under the control of the IAA. Following the war, South-Central Brazil, led by the State of São Paulo, shifted investments from coffee into sugar and by 1953, had outstripped the Northeast in production at lower costs and under better management. The internal market was thus lost to the tradition-minded Northeast usineiro (mill and plantation owner) and fornecedores.

The development of southern competitive pressure coincided with a period of rapid inflation. Price regulations and financing mechanisms by the IAA were generally out of phase with inflationary

cost movements. Thus, the Northeast sugar industry was progressively decapitalized and financially less able to make productivity-increasing investments. Furthermore, in southern Brazil, the expansion of cane production was accompanied by the rapid growth in other areas of agricultural production. The cane monoculture in the Northeast, in contrast, was not faced with competition for alternative uses of land and manpower controlled by, or available to sugar planters. The continued abundance of these factors acted as a counter incentive to modernization. In the Northeast, increases in production invariably involved the use of additional land and labour, without significant regard to increases in factor productivity.

With rising costs of production, declining yields, and poor management, the Northeast sugar industry drifted inexorably toward the edge of bankruptcy. This last and most serious crisis of the industry became manifest in the explosive social and political situation of the 1958 to 1963 period, prior to the 1964 Revolution.

Cane monoculture and the dominance of the sugar industry also had a profound influence in shaping the development in the Zona da Mata of rural communities, towns, road networks, land tenure patterns, institutions, and in reinforcing dualism and class stratification.

Settlement patterns in the Zona da Mata, were for a long time directly controlled by the spread of the sugar industry. Because in the early period, towns and cities were merely political and ecclesiastical centers, few marketing or other service functions developed in them.

During this period, each engenho formed a small, relatively self-contained community. The large usinas which came later, merely grouped these into larger and even more thoroughly self-sufficient settlements. As a consequence, road and highway networks remained rudimentary, further forcing plantations to provide needed services by mounting ever larger and more complete facilities. All usinas developed their own capabilities and facilities in such areas as construction, carpentry, electrical repairs, road (and often railroad) construction and maintenance, foundry work, the repair of milling equipment, and often even the design and building of new equipment and machinery.

The infamous barracão (company store) supplied workers with consumer goods, including food stuffs which could not be produced on plots of land traditionally allocated by the patrão (landlord) to permanent workers. Beyond this, medical and educational services, in keeping with the ancient patronal traditions derived from the past, and now required by law, progressively became the responsibility of the plantation enterprise, and filled out a complex of basic community elements on the farm. The provision of housing for workers was always required of the employer.

Thus, the off-farm communities of the sugar zone never evolved the ubiquitous features of the market town common to rural areas elsewhere. Commercial districts, storage plants, commodity collection centers, transhipment systems, hotels, and restaurants, were rudimentary

or non-existent. Social services, extended by municipal governments never became significant. Nor did municipalities enjoy the fiscal or technical support of the dominant landholding and commercial enterprises. State governments scarcely carried other than political functions, and always in penury, could do little to improve services to rural areas.

Land tenure patterns in the Zona da Mata, since the occupation of the land by the Portuguese over four centuries ago, have been characterized by large, latifundium-type properties, although, over time, there has been a gradual increase in the number of small farms. While these account for only a small portion of the total area in farms, they are clearly dominant in terms of the total number of rural properties.

In many municipalities of the Zona da Mata, particularly in the southern part of Pernambuco and the northern part of Alagoas, land held by sugar mills often accounts for more than half of all the land in farms. Of thirty-two municipalities in the Zona da Mata of Pernambuco, where the sugar industry is dominant, twenty-five municipalities have a tenure pattern in which seventy per cent of all land is held in properties larger than three hundred hectares. The bulk of these holdings are usina lands, that is, plantations belonging to sugar mills. In a few instances, virtually all of the land of a municipality is held by one or two sugar mills. In Pernambuco and Alagoas, the two states which together account for seventy per cent of all sugar cane produced in the Northeast, sugar mills with over 15,000 hectares (36,000 acres)of land are not uncommon.

A national farm cadaster initiated by the Brazilian Institute of Agrarian Reform in 1965, produced the following data for 1967, for the Zona da Mata of Alagoas, Pernambuco and Paraíba, part of which was subsequently designated as an "agrarian reform priority area".[4] Farms up to twenty-five hectares accounted for seventy-five per cent of all farms and held only twelve per cent of land in farms. At the other extreme, land holdings five hundred hectares (1,250 acres) and over, representing less than one per cent of farms, controlled thirty-three per cent of land held. The data is summarized in the following table:

Farm Size (hectares)	Per cent of total number of farms	Per cent of Land held
0 - 25	75	12
25 - 200	23	36
Over 200	2	52
Over 500	1	33

To the best of knowledge of the author, no research exists on the relationship between land ownership and the economic, social, and political realities in the Zona da Mata. However, the dominant position of large land holdings, represented mainly by the sugar industry, is apparent. Apparent also are the exceedingly low proportions of areas held by small farms. A comparative study of capitalization

[4] Unpublished data from the IBRA Cadastro Geral de Imóveis Rurais, 1967, as issued by the IBRA Delegacia, Recife, Pernambuco.

and income on large and small farms, along with an analysis of political and social influence of the organizations representing these two farm types, would, in all likelihood, reveal that, through joint effort, the larger holdings command and utilize more absolute and varied power than the smaller units.

Sugar enterprises are commonly parts of larger, more diversified industrial and commercial firms, involved in light manufacturing, banking, the news media, and other activities within and outside of the Zona da Mata. Business associations and political connections of sugar interests are vociferous and successful advocates for special concessions by the public sector. Specialized subsidized prices in times of crisis extensive credit, moratoria on loan installments, favourable market quotas, and many other advantages are gained by the landed sugar interest.

In contrast, the small farmer, particularly the non-sugar farmer enjoys few if any of these amenities and advantages. If he does not hold secure title to his land, which is frequently the case, he cannot obtain bank credit. If he does obtain credit from official sources, it is usually not at the same favourable conditions available to the larger enterprises. In the absence of an effective marketing system, he is often dependent upon middlemen who, depending upon the alternatives and economic position of farmers, are able to manipulate prices in their own favour. If the small farmer grows sugar cane, his freedom of choice may be just as restricted. He is dependent upon the nearest sugar mill to buy his cane.

The existence of a fairly elaborate institutional system for agricultural research, extension, rural credit, the publication of marketing information, and a range of other services, has not guaranteed that the small farmer will be able to avail himself of these. A wide range of farm supplies are available in all of large coastal capitals of the Northeast. However, isolation or prohibitive costs when bought in small quantities, often make such inputs inaccessible to the small farmer.

The position of the landless rural worker was (and still is) even more precarious.

Of 4,072 individuals studied in 1961 by the Joaquim Nabuco Institute of Social Research (IJNPS) in different municipalities of the Zona da Mata, seventy-five per cent were illiterate.[5] Only sixteen per cent were considered literate, another nine per cent could write their name. Only five per cent of those of school age, which themselves represented forty-five per cent of the sample, were attending school.

A follow-up survey[6] of 477 families in 1964, by the same Institute, revealed that eighty per cent were illiterate, 6.6 per cent could only write their names, only four per cent of the five to fourteen age group were in school, and only one per cent had completed four years of primary schooling.

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[5] Instituto Joaquim Nabuco de Pesquisas Sociais, Nível de Vida do Trabalhador Rural da Zona da Mata, by Telmo Frederico do Rego Maciel, Recife, 1964, p. 14.

[6] Fernando Antonio Gonçalves, Condições de Vida do Trabalhador Rural da Zona da Mata do Estado de Pernambuco-1964, Separata do Boletim No.15, Instituto Joaquim Nabuco de Pesquisas Sociais, Recife, 1966, p. 125.

The background to this dismal picture lay in the region's education system. The formal education structure was composed of an assortment of municipal, state, and federal schools in urban communities, supplemented on sugar plantations by private schools, frequently staffed by lay teachers, who rarely had more than four years of schooling themselves. In the cities, parochial and other private schools provided a substantial portion of the educational services to the elite groups.

A major nutritional study of Northeast Brazil was conducted in 1963, jointly by the United States Interdepartmental Committee for National Development and several Brazilian government agencies, and provides some relevant reference data.[7] Of sixteen places studied, nine were located in the Zona da Mata. The conclusions were that the Northeast generally did not produce sufficient food to provide a nutritionally adequate diet for its population. A serious issue was that fully thirty-seven per cent of the food energy produced was represented by the marginally useful commodities of sugar and cacao. Both caloric and protein availability were below adequate. Growth in infants, although normal at birth, at six to nine months of age was found to be significantly below normal.

Diseases were prevalent. Vitamin A deficiency led to widespread eye and skin maladies. Diarrhea occurred in about one third of those

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[7] U.S. Department of Defense, Interdepartmental Committee on Nutrition for National Development, Northeast Brazil: Nutrition Survey, March-May 1963, General Summary, pp. 8-10.

examined. Almost all were infected with parasites. Liver enlargement was present in twenty eight per cent of all males and in forty-three per cent of females. Histories of malaria, trachoma, tuberculosis, and anemia were common.

There was a high variability of nutritional intake, with a pattern of two meals per day predominating. Meals consisted mostly of carbohydrates and the best protein sources were limited to one meal. Mothers were generally ignorant of baby feeding, although no unusual beliefs or prohibitions were evident. Thiamine and riboflavin intakes appeared critically low in some families.

Because of the growing financial difficulties of the sugar industry during the late 1950's and early 1960's, sugar mill and plantations owners often failed in their responsibility to pay the minimum wage required by law.[8] Attempts on the part of the government to enforce the law, only aggravated the already miserable condition of the rural worker. To achieve economies, the industry began dismissing many of its regular workers, and began hiring on a daily basis. Fringe benefits, such as housing, the right to a subsistence parcel, health care, and elementary education, which traditionally was the responsibility of the employer were often curtailed.

The worsening economic crisis in the Zona da Mata was accompanied by growing social unrest. By the late 1950's the time was ripe for political demagoguery to develop in the midst of rural labour. The much publicized Peasant Leagues (Ligas Camponesas) sprang up, followed by numerous rural

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[8] In 1960, roughly equivalent to U.S.$18 per month

labour unions led by radical-socialist factions. Finally, the Church-led rural labour movement began to make headway, and by the time of the Revolution of 1964, had surpassed the Ligas Camponesas in power and influence among rural workers.

In short, the early years of the 1960's in the Zona da Mata were a period of excruciating economic and political events that had their profoundest effect on the rural masses, as well as upon the unemployed migrants in the capital cities of the region. Rural wages were at starvation levels, education and nutrition were abysmally bad, and the collapse of the sugar industry was imminent.

When the Revolution of 1964 checked further wild political and social gyrations, the scene was set for a new chapter in the complex history of the Zona da Mata.

In June of 1965, the federal Government established the Inter-ministerial Sugar Working Group (GTIA), and subsequently, with the issue of Federal Decree 59.033 of August 8, 1966 created GERAN, the Special Group for the Modernization of the Northeast Sugar Agro-Industry. Because of early organizational difficulties, GERAN did not become fully functional until December of 1968. GERAN's mandate for the Zona da Mata is to modernize the Northeast sugar industry, to promote the diversification of agriculture, and to modify the region's agrarian structure through land reform.

In 1968, the Zona da Mata had a total of 104 sugar mills, and over thousand independent cane growers or fornecedores. The total

area planted to sugar cane at that time was estimated at 500,000 hectares. Some 400,000 workers were directly employed by the industry and by independent growers, while in total, the livelihood of some two million people, or over one third of the total population of the Zona da Mata was (and still is) directly or indirectly dependent upon the industry .

GERAN's program is schematically simple and represents an adroit balancing of both economic and social purposes. Sugar cane and sugar producers are encouraged to apply for financial assistance from GERAN and other official sources to modernize their enterprises, but must comply with certain minimum social interest requirements. One of these is commitment to release lands to the government to settle labour liberated in the modernization process. It is estimated that as many as 60,000 workers presently employed by the industry will be released over the 1971 to 1980 period. Over the same period, the expropriation of some 320,000 hectares of land is anticipated, which is to be used to settle 17,000 families in colonization projects.[9] The remaining workers will need to find work elsewhere.

The GERAN program, if it can be implemented successfully, represents a rational if not ingenious proposal to alleviate the chronic ills of the Zona da Mata and the Northeast sugar industry. However, while the explicit concern for the welfare of the rural worker represents the most laudable aspect of the program, it is also the most difficult one, and the least likely to achieve more than marginal success.

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[9] Statistics on the number of workers per family are conflicting, but fall between 1.5 and 2.0.

III

LAND SETTLEMENT AND LAND REFORM IN BRAZIL

A BRIEF HISTORICAL PERSPECTIVE

3.1 Introduction

The purpose of this chapter is to present a synoptic view of planned settlement activities in Brazil, of the development of settlement laws and procedures, and of Brazil's agrarian reform law of 1964 as it relates to land redistribution and resettlement. The last part of the chapter is devoted to a brief discussion of several pertinent studies and papers which have dealt with various aspects of land reform and colonization in Brazil.

The terms "settlement", "colonization", and "parcelization" which recur throughout this study are used synonymously and refer to the subdivision of a contiguous area of agricultural land into small parcels for the purpose of establishing immigrants and native rural families on land of their own. Under the Brazilian Land Statute of 1964, colonization is defined as:

> "Any government or private activity intended to confer tenure of land and to advance the economic use thereof, through the pursuit of regular farming activities, by the subdivision of land into lots or allotments, on a scale in keeping with the regions specified under the regulations governing the Land Statute, or by means of producer cooperatives provided for therein."[1]

Thus, the term "colonization" refers to a planned activity resulting in

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[1] Brazilian Land Statute, Decree No. 59.428, Chapter I Art. 5, October 27, 1966, Instructions on Law 4505 of Nov. 30, 1964. Free Translation by Walter E. Beck, (U.S. Agency for International Development, Rio de Janeiro, 1967) Mimeo, p.3

the establishment of a colonization or settlement project. It is distinct from spontaneous or unorganized occupation of land or frontier settlement.

Settlement projects are established by both public or private organizations. They acquire and subdivide the land, establish basic infrastructure, select the families to be settled, provide financial and technical assistance to settlers, arrange for social organization and services, and provide the administration for the project until its emancipation and independence. In the majority of projects, the beneficiary is expected to pay for the land, his house, and various items of inventory received at the time of settlement. Upon full payment of his debt, he is given title to his property. Once all settlers have met their financial obligation, normally within a ten to fifteen-year period, the project is emancipated and its administration devolves upon the settlers.

3.2 Land Settlement in Brazil: 1810 - 1970

Earliest government efforts at planned colonization can be traced back to the beginning of the last century and the establishment in 1812, of a núcleo colonial at Vianna in Espírito Santo for the settlement of immigrants from the Azores. The same decade also saw the establishment of two Swiss colonies, Leopoldina in Bahia, and Nova Friburgo in Rio de Janeiro. Between 1820 and 1830 the first German colonies were established in the states of Rio Grande do Sul, Santa Catarina, Paraná and São Paulo.

The experience of the colony of Nova Friburgo is particularly instructive. The project was to serve as a focal point for encouraging the promotion and spread of small farming habits and practices. Settlers were granted free and full titles to the land, were provided with free livestock and seeds, were given tax exemption for twelve years, and were promised assistance to return to their home country if they so desired. In time, the 2,000 settlers of Nova Friburgo were completely acculturated and incorporated into the Brazilian population. However, the principal objective of the project was not achieved. As settlers acquired some wealth many hurriedly bought up surrounding lands, bought slaves, and became plantation owners.[2]

A decree passed in September of 1830, forbade the use of public funds for the settlement of foreigners, and brought immigration and colonization to a temporary standstill. The sanction was partly brought on by widely diverging interests between different states on matters of immigration policy. São Paulo and other states in which plantation agriculture was dominant, were primarily concerned with the recruitment of immigrant labourers to work the fazendas and large plantations. The states of the South, on the other hand, pursued policies aimed at the promotion of the small, independent family farm, and for this end lobbied for government grants to establish colonies and to attract European settlers. The southern states, notably Santa Catarina,

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[2] T. Lynn Smith, Brazil, People and Institutions, (Baton Rouge: Louisiana State University Press, 1963) p. 400

reacted to the new law by pursuing an independent immigration policy, and by establishing the first land grant companies.

The second half of the eighteenth century brought many important changes. Under the leadership of Dom Pedro II, immigration and colonization became important government priorities. New laws governing land transactions and settlement came into being. In response to criticism at home and adverse publicity abroad, numerous studies and investigations were commissioned to correct abuses of immigrant workers and to remedy the often haphazard manner in which colonization activities had proceeded. The period between 1850 and 1880 saw the establishment of numerous Polish, Ukrainian, Italian, and a few German settlements in the states of Espírito Santo, Paraná, Santa Catarina, and Rio Grande do Sul. In addition, many immigrants continued to enter São Paulo and other plantation states to work for hire or as share-croppers.

In 1888, slavery was abolished, and the following year Brazil became a republic. The next two decades were characterized by a great increase in the number of immigrants from all parts of Europe. Many of the earlier European settlements of the south gave rise to second generation colonies which sprang up throughout the region. This period also saw the arrival of the first Japanese immigrants and the establishment of Japanese settlements in the states of Rio de Janeiro, São Paulo, and Paraná. The abolition of slavery and a continuing increase in the number of landless rural workers also brought on the first concerns for the need to settle the country's own rural families.

By 1910, colonization procedures and regulations represented a substantial body of federal law, and many of the legalistic and other precedents from which subsequent settlement policy was to emerge had already been firmly established. Two federal decrees passed in 1911,[3] governing the establishment of núcleos coloniais and of centros agrícolas illustrate the extent to which colonization policy had already been formalized by that time. They also reflect an important distinction in settlement procedures for immigrants and native rural workers.[4] Both decrees are well documented by Galjart.[5]

> "A Núcleo Colonial has to contain: schools for primary agricultural education, demonstration fields and workshops. It may contain: breeding bulls, installations for the processing of agricultural produce, machines and implements and animals that the settlers may use during the first six months.
> The settlers will receive: upon arrival, three days food; during the first six months, employment in the labour force of the settlement in such a way that each adult will be employed about 15 working days per month; during the first year, free medicines; and until the date of emancipation of the settlement, free medical care. Seed, seedlings and publications may be distributed by the administration. After consultation with the local authorities, a local market will be organized.

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[3] Decree 9801 of Nov. 1911 and Decree 9214 of Dec. 1911, governing the núcleo colonial and the centro agrícola, respectively.

[4] The núcleo colonial was primarily intended for the establishment of immigrants, while the centro agrícola was to serve native settlers.

[5] Benno Galjart, Itaguaí, Old Habits and New Practices in a Brazilian Land Settlement, (Wageningen: Centre for Agricultural Publishing and Documentation, 1968), p. 17.

> The plots must be smaller than 25 hectares and normally shall include an already constructed house. The plots can be sold (to the settler) for cash or in instalments. Thirty per cent of the plots can be reserved for Brazilian nationals. The settler may not alienate his plot or his benfeitorias (improvements) as long as he is indebted to the Colony. If without valid reasons, he fails to cultivate his plot over three months, he shall be evicted. Only after having received definite title to his first plot can a settler buy a second plot..... The regulations covering the Centros Agrícolas differ in some ways from these provisions. A Centro is meant for national labourers domiciled in the state containing the Centro. The Government shall provide the same installations as in a Núcleo Colonial, and with minor variations the settlers do receive the same benefits as the immigrants. There are some regulations over the selection, but these are not exacting. The main condition is that the settler be an agricultural labourer. More important is, that his behavior is subject to some prescriptions. Not only can he be evicted if he has failed to cultivate his plot for three months, he also has to live on his plot. He is not allowed to keep animals except on enclosed fields especially designated for this purpose. Finally he may not alienate his land or his benfeitorias nor conclude any other contract which impedes the free cultivation of his plot until such time as he has received permanent title to the land. After that date he may alienate his land only with permission of the Ministry, and to somebody who meets the conditions put forth in this decree."

The outbreak of World War I brought immigration to a temporary halt, but was followed by a peak immigration period during the 1920's and the establishment of numerous new agricultural colonies throughout the states of Southern Brazil.

The period from 1929 onward and until World War II was characterized by a gradual decline in immigration and by a tightening of control by federal authorities on all matters pertaining to immigration and colonization.

Because of non-interference by the government in the preference of immigrant groups to settle where they found concentrations of people

of their own background and nationality, many of the European settlement of the South, had developed into often large, ethnic and cultural islands. During the early thirties, many of the German settlements came increasingly under the influence of propaganda from abroad, and were seen as a genuine threat to Brazil's national security. In 1938, a law was passed authorizing the National Council of Immigration and Colonization

> "to prohibit the concession, transference, or renting of lots to foreigners of a nationality whose concentration or preponderance in a nucleus, center, or colony, now being founded or emancipated, might be injurious to the ethnic or social composition of the Brazilian people."[6]

This law also provided that colonies shall contain a minimum of thirty per cent Brazilian settlers and a maximum of twenty-five per cent of any other single nationality. In 1939, another law made the use of the Portuguese language mandatory in all school, and imposed strict control upon political activities in the European communities of the South.

After World War II, immigration resumed, but most of the new arrivals went to the cities. Nevertheless, because of a greater concern than before for agricultural and rural development and for the need to settle the country's own landless rural families, colonization activities in all parts of the country were expanding. This concern is reflected in a law passed in September of 1945, in which the objectives of colonization are redefined as follows:

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[6] Smith, Brazil, People and Institutions, p. 418

" To promote the firm attachment of man to the land. To encourage regional economic development, and to raise the levels of living, health, and education of the rural population"[7]

Parallel with the country's concern for improvements in the social and economic situation of her own rural families, was a growing awareness of the need for the restructuring of the archaic system of land tenure. The initial move was made in 1947 with the presentation to the Brazilian Congress of a proposal for an agrarian reform law. However, no action was taken until 1951, after the reelection of Getúlio Vargas, when the government created the National Commission for Agrarian Policy. The Commissions' first document was entitled "Directions for Agrarian Reform". It was a draft law on the expropriation and redistribution of land in the social interest, and was presented to the Brazilian Congress in 1953. The ensuing deliberations however, did not lead to any concrete legislation or to reform action. With the death of Vargas in 1954, land reform as a government issue was temporarily put aside, and was overshadowed by other national priorities.[8]

In 1954, responsibility for federal colonization programs was transferred from the National Council of Immigration and Colonization, which then passed out of existence, to the newly created National Institute for Immigration and Colonization (INIC). INIC inherited some twenty settlement projects established by its predecessor, and over the follow-

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[7]Federal Decree No. 4.967 Article 46, Sept. 18, 1945

[8]Including the construction of Brasilia, the national automotive industry, and the Belém-Brasília highway.

ing eight years created ten new colonies, of which seven were established in the Northeast.

In 1961, renewed federal interest in agrarian reform led to the appointment of a special working group to study the problem. The group, which was led by Senator Milton Campos, concluded that the land tenure structure and the need for land redistribution was one of the most pressing issues. The National Economic Council subsequently made proposals for a draft law based upon the results of this study. In February of 1962, the government created the National Council for Agrarian Reform, whose main task was to plan and to make preparations for such reforms. The Council was also to coordinate the activities of INIC, the Rural Social Service, and the National Bank of Cooperative Credit. Eight months later, the Council was replaced by the Superintendency for Agrarian Policy (SUPRA), under which all of the above institutions were integrated. SUPRA became an semi-autonomous institution under the Ministry of Agriculture. The Superintendency's function was to promote agricultural developments, and to plan and execute agrarian reform programs. Reflecting the political tensions and uncertainties of that time, SUPRA was relatively short-lived, and with the change in government, following the Revolution of March of 1964, passed out of existence.

The new government could not afford to remain silent on the critical issues of agrarian reform and agricultural development. In November of 1964, the Brazilian Congress adopted a comprehensive law on land reform, the Estatuto da Terra (Land Statute).[9] That law became

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[9]Instituto Brasileiro de Reforma Agrária, Estatuto da Terra Lei No. 4,504 de 30 de novembro de 1964. (Departamento de Imprensa Nacional, 1964)

the point of departure for most subsequent action in this field. It created the Brazilian Institute of Agrarian Reform (IBRA) and the National Institute for Agricultural Development (INDA); it established land reform policy and norms, including the designation of agrarian reform priority areas. The law also became the basis for a nation-wide farm cadaster, it decreed a rural property tax, authorized bonds for partial payment of expropriated property, and established a series of auxiliary services in support of land reform activities.[10]

The passing of the Land Statute marked the end of the National Institute of Immigration and Colonization. Responsibility for land distribution and settlement was passed on to IBRA and INDA. IBRA became responsible for colonization in the four agrarian reform priority areas, (Rio Grande do Sul, the Federal District, the State of Rio de Janeiro, and the coastal region of the states of Pernambuco and Alagoas). INDA assumed responsibility for colonization in all other parts of the country. IBRA and INDA also took over the control of all settlement projects that were previously administered by the National Institute of Immigration and Colonization (Fig. 2).

In the Northeast priority area, IBRA was instrumental in establishing in 1965, the Colony of Quatis in Pernambuco. In 1966 IBRA joined SUDENE (Superintendency for the Development of the Northeast) and three other Northeast agencies in the Interministerial Sugar Working Group (GTIA), whose deliberations led to the creation of GERAN, the Special Group for the Rationalization of the Northeast Sugar Agro Industry. In

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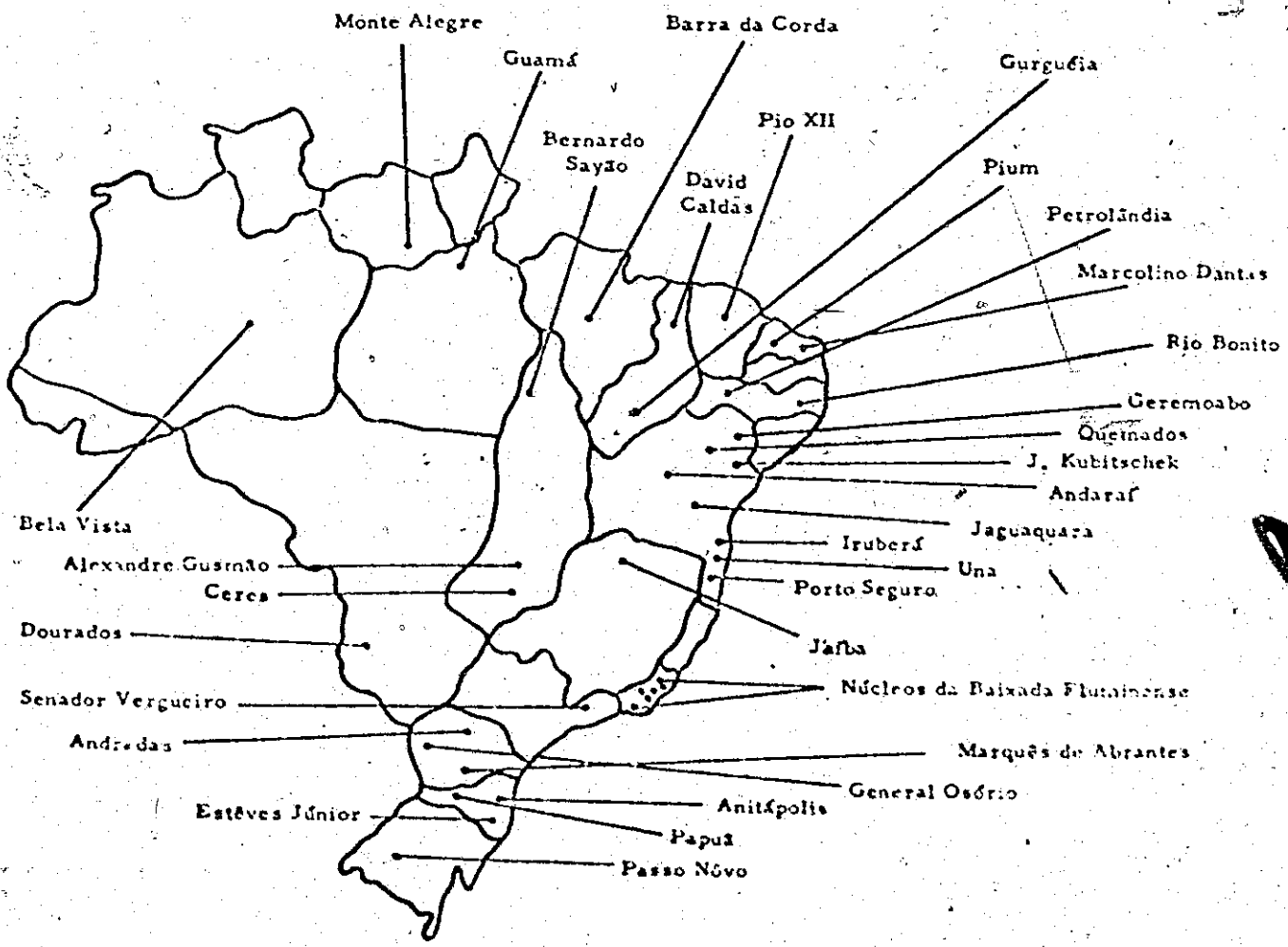
[10] Further details follow in Section 3.3

FIGURE 2

COLONIES OF IBRA AND INDA - 1967



Source: Plano Decenal de Desenvolvimento Econômico e Social, Agricultura e Reforma Agrária, Ministério do Planejamento e Coordenação Economica, Março 1967, p.564

the same year, IBRA intervened in bankrupt Usina Caxangá in Pernambuco, modernized the sugar mill, and redistributed a portion of the 15,000 hectares of land, belonging to the mill, among sugar workers in accordance with colonization norms under the Land Statute. Also in 1966, Rio Tinto, a collective colony in Paraiba was established. In addition to the colonization activities of IBRA and INDA, various state and private organizations as well as SUDENE have been involved in the establishment of new settlements in different parts of the Northeast.

A survey made by Genschow [11] in 1967, shows a total of 334 registered federal, state, and private colonization projects for all of Brazil, embracing an estimated total area of 8.7 million hectares. Included in this number are projects in various stages of implementation and many recent projects, as well as a number of colonies that were established prior to World War II, but still had not been emancipated by the time of Genschow's survey.

The number of colonization projects in the Northeast, in 1968, was fifty-nine, involving a total of 19,229 families and a total area of 851,949 hectares of land (Table 2). One third of these projects were administered by IBRA and INDA, the remainder by state and private organizations.

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[11] Fernando A. Genschow, O Plano Nacional de Colonização, A Colonização no Brazil, (Instituto Nacional do Desenvolvimento Agrário, Rio de Janeiro, April 1967)

COLONIZATION PROJECTS IN NORTHEAST BRAZIL (1968)

STATES	Number of Projects				Total Area ha.	Total Number Settler Families	Other Families *
	Total	Federal	State	Private			
Pernambuco	15	6	9	-	45,530	2,445	257
Piauí	8	2	2	4	234,247	714	1,502
Ceará	2	1	-	1	4,793	25	189
Bahia	15	7	8	-	69,052	1,227	810
Maranhão	3	2	-	1	415,000	1,400	5,600
Sergipe	8	-	4	4	17,176	608	1,700
Alagoas	3	-	1	2	34,551	575	407
Rio Grande do Norte	3	2	-	1	5,885	136	17
Paraíba	2	1	1	-	25,715	46	1,570
Total	59	21	25	13	851,949	7,176	12,053

*Usually moradores (squatters) and families employed by settlers.

Source: Vincenzo d'Apote, Bases para uma Politica de Reforma y Colonizacion en el Nordeste del Brazil, SUDENE/FAO, Recife, 1970

Proposals under the GERAN program for the resettlement of some 17,000 families between 1971 and 1980, and a recent announcement by the federal government of the decision to commence construction of the Trans Amazonica Highway, and to open up extensive interior areas for colonization,[12] are strong indications that the planned land settlement project continues to be the government's preferred method of establishing landless rural families.

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[12] A strip of land, ten kilometers in width, is to be reserved along either side of the Trans-amazonica Road for the establishment of settlement projects. Initially, 100 projects (agropolis) are planned, for the establishment of 100,000 families. Each agropolis will have 1,000 families, but will be sub-divided into smaller colonies (agrovilas) of sixty families each. The agrovila will have a primary school, a small commercial center, a church, and a sportsfield. The agropolis will have all of these and in addition a secondary school, a health post, storage and processing center for agricultural products, and a large commercial center. The whole structure will be crowned by six large cities (ruralpolis) with hospitals, high schools, industry, etc. The beginnings of such cities exist already, eg. Altamira and Itaituba. The total population of the area is estimated to reach 2.5 million people by 1980. Each settler is to receive 100 hectares of land. They will live in villages. The layout of each project is planned in such a way that a settler will never live more than five kms. from his lot. Settlers are to be provided with housing, financial and technical assistance, marketing, and various services. As in previous settlement project, setters are expected to pay back a major portion of the investment. Project costs for the first four years are estimated at U.S.$220 million. The project is to be administered by the National Institute of Colonization and Agrarian Reform (INCRA) which superseded IBRA and INDA in 1970 (Source: USAID/Brazil/NE, Memorandum of Conversation "INCRA Plans for Trans-amazonica", Recife, July 1971).

3.3 The Land Statute, Agrarian Reform, and Land Settlement

Under Decree 55,891 of Chapter I of the Brazilian Land Statute, the broad objectives of agrarian reform are defined as follows:

> " To improve the system of land tenure and to foster the development of better relationships between man, the rural property, and the use of the land, in accordance with the principles of social justice, aiming for increased agricultural production, the well-being of the rural worker, the economic progress and development of the country, and the gradual elimination of the minifundio and latifundio."[13]

The Land Statute recognizes four land tenure categories: the empresa rural, the minifundio, the latifundio by use, and the latifundio by size. Only those properties falling within the first category are considered desirable, all other properties theoretically come under the threat of expropriation or abridgment of free disposal.[14]

The four tenure categories are derived on the basis of the modulo system. The modulo rural is defined as "that quantity of land which is capable of absorbing all the labour of four working adults and of supporting them at a standard of living which is consistent with the overall goals of economic progress and social justice."[15] The modulo recognizes regional variations in land capability, economic conditions,

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[13] IBRA, Decreto No. 55.891 de Março de 1965, Capítulo I, Estatuto da Terra. (Free translation)

[14] Armin K. Ludwig, Harry W. Taylor, Brazil's New Agrarian Reform, An Evaluation of its Property Classification and Tax Systems, (New York: Frederick A. Praeger, Publishers, 1969), p. 5, 6.

[15] Ibid. p. 12

differences in local minimum salaries and costs of living. It also takes into consideration returns to capital and land, as well as the fact that housing and various other social benefits, which traditionally were provided by the patrão or landlord, would, under post-reform conditions, become the responsibility of the reform beneficiary. Taking all of these factors into account, Ludwig and Taylor show that a modulo must not only be of sufficient size to absorb the labour of four adults, but must also be able to generate an income equal to 1.6 times four minimum salaries for the region concerned.[16] In addition, to cover capital costs, the property must yield an annual return (over and above the four times 1.6 minimum salaries) of 22.5 per cent of the improved value of the land.

The modular farm may range from two to 120 hectares in size, depending upon the enterprise type of the farm and its location. All farms less than one modulo are classified as minifundios and are undesirable. Those up to 600 modulos in size are either rural enterprises (empresas rurais) if rationally farmed, or latifundios by use (latifundio por exploração) if not efficiently operated. All holdings over 600 modulos are automatically classified as latifundios by size (latifundio por dimensão). To determine which properties will qualify as rural enterprise, a series of involved formulae are applied which take into consideration various factors relating to the intensity of land use and to the social conditions on the property being classified.

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[16] In mid-1970, the monthly minimum salary for Pernambuco was equal to U.S.$27. Minimum salaries are somewhat higher in Southern Brazil.

The objective then, of the property classification system is to identify those rural land holdings which in the light of national goals and values are considered undesirable. The threat of expropriation, it is hoped, will induce landowners to make adjustments in resource use, the internal organization of their properties, and if necessary in property size, to permit the reclassification of such holdings as rural enterprises.

To further encourage such voluntary adjustments, the Land Statute provides for an elaborate system of differential land taxation. The tax system is structured in such a manner that (in theory at least) it rewards those landowners who have achieved or who are working toward the attainment of the social and economic norms set out by the government, while properties in continuous disregard of these standards, are penalized by heavier taxes.

Assuming that the threat of expropriation, combined with differential rural property assessment would result in the gradual restructuring of the tenure system and would induce the desired social and economic changes,[17] the government would only need to regulate such changes and to acquire and redistribute delinquent properties. Land acquired in this manner becomes public domain. It is used for government or private colonization projects on which single family farms are established. Such lands are also made available to various federal, state or local govern-

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[17] This assumption is one of the fundamental tenets underlying the Land Statute, and reflects the basically moderate, if not conservative nature of Brazil's agrarian reform law.

ment organizations for reforestation, and for agricultural research and experimental stations.

In all reallocation of land, priority is to be given to all minifundistas whose land has been expropriated because it was insufficient to sustain a family, and did not conform to the modulo standard. Next in line are squatters, sharecroppers, renters, and landless rural workers, as well as those having special farming skills, including immigrants.[18]

In accordance with Decree 59.428 of October 27, 1966 and IBRA Instruction No. 13 of April 1, 1967, colonização oficial through IBRA and INDA, and colonização particular through private organizations, are to be the only methods by which land is to be redistributed for the establishment of small, modulo-sized farms.[19] Thus, except for colonization on land which is already held by the government, or on land acquired by private organizations, the previously outlined reform measures would first need to be enforced before colonization activities could take place on any significant scale. Land released through adjustments in size of very large properties, and through expropriations would then become available to the government for purposes of colonization.

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[18] Walter E. Beck, USAID/ARDO/BRAZIL, Free Translation of Decree No. 59.428 and IBRA Instruction No. 13.

[19] Private Settlement efforts are subject to the same regulations as "official" or government settlement.

For a number of reasons, as will be shown, the reform measures provided for under the Land Statute have not have been very effective.

Between 1964 and 1966, IBRA completed the enormous task of registering nearly 3.5 million rural properties. Rural land tax bills computed on the basis of cadastral data were issued annually beginning in 1967. However, enforcement of the tax has been lax and haphazard. By the end of 1968, IBRA reported a delinquency rate of as much as thirty per cent. According to some sources, the percentage of uncollected tax bills was still higher the following year.

As an instrument of land reform, the land tax has been completely ineffective. Ludwig and Taylor[20] point out that the tax structure is too complex to be understood by the majority of land owners, that the taxes are too low, and that the range between the highest and the lowest possible tax level is too narrow to act as penalties or incentives to induce change in the desired direction.

Since the land tax and the threat of expropriation have not resulted in the changes envisaged under the Land Statute, IBRA could invoke the law and exercise its prerogative of expropriation. Except for a few isolated cases, IBRA has refused to do so. In addition to important political considerations, there are other, rather compelling reasons for this lack of action. Ludwig and Taylor show that, of the 3.5 million properties registered by 1969, fewer than ten per cent qualified

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[20] A.K.Ludwig, H.W.Taylor, Brazil's New Agrarian Reform, p.91

as empresas rurais. These represented an estimated twenty per cent of the total value of all Brazilian rural properties. All remaining properties, representing an estimated total value of 6 billion dollars, or three times the value of the entire federal budget for 1967, would therefore be subject to expropriation. Given IBRA's claim to three per cent of the federal budget (of which the agency received only a fraction during each of its six years of operation), it would take close to 100 years to redistribute all expropriatable properties.[21]

Confronted with the immense burden of indemnifying the former owners of expropriated land, IBRA would also be faced with staggering investments in resettlement and colonization. Between 1964 and 1970, IBRA and INDA settled fewer than 15,000 new families, yet, various estimates suggest that an effective reform program would require the establishment of anywhere from 50,000 to 270,000 families per year.

Franco,[22] using the 1950 federal census figure of 3.2 million landless rural families, suggests that a minimum of 50,000 families would need to be settled annually for the next 20 years. Chacel,[23] using 1960 census data and making the assumption that all future increases in rural population will be absorbed by the non-agricultural sectors, suggests that a minimum of 100,000 families would need to be

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[21] Ibid. pp.62-64

[22] Alberto Franco, et al. Condições Sociais Associadas à Posse da Terra e suas Implicações Agro-Industriais. (Rio de Janeiro: IICA-CIRA, Materiais de Ensino para Reforma Agrária No. 6, 1965)

[23] Julian Chacel, Reforma Agrária no Brazil, Curso Internacional de Reforma Agrária, IICA-BID, Campinas, CETREC, 20 de maio-20 de Junho 1963.

settled every year for the next 45 years. Estimates made by the Inter-American Committee for Agricultural Development (CIDA), which assume that only a small portion of the increase in rural population will be absorbed by the non-farm sectors, place settlement requirements at 272,000 families per year.[24] No information is given as to the number of years over which such settlement would need to continue.

If the intermediate estimate of 100,000 families to be settled annually were to be taken as a possible government target, and if each family were to receive twenty hectares, then a minimum of two million hectares of arable land would need to be expropriated every year. At an estimated average settlement cost of U.S.$5,000 per family (based upon 1970 government estimates), at total of U.S.$500 million would be required annually for settlement projects alone.

While investments in colonization are to be reclaimed from settlers over a period of ten to fifteen years, and while considerable production increases would result from the fairly intensive use of previously unused or poorly used agricultural land, such a massive land redistribution and colonization program would, nevertheless, place an inordinate financial burden upon the economy of the country.

In view of the constraints of Brazil's capital-scarce economy, the government's aversion toward interference in property rights, and

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[24] Quoted in: José Gomes da Silva, Reforma Agrária, Ministério da Agricultura, IBRA/NE, Serie: Estudos No. 1, Recife: Outubro de 1968, Mimeo. p. 12.

the alternative, although costly, of increasing agricultural output by expanding the extensive margin of production, it is not surprising that until now agrarian reform in Brazil has failed to become a concrete reality.

In the meantime, agrarian reform and agricultural development continue to be important government issues, and limited action should not be equated with lack of concern. In July of 1970, the federal government announced the reorganization and consolidation of IBRA and INDA to form one new federal institution with the acronym INCRA, the National Institute of Colonization and Agrarian Reform. INCRA will

> "assume all rights, competencies, and attributes of responsibilities of the Brazilian Institute for Agrarian Reform (IBRA) and of the National Institute for Agricultural Development (INDA), which become extinct."[25]

Shortly after the creation of INCRA, the government announced its intention to commence with the construction of the Trans-amazonica Highway. As pointed out earlier (cf. footnote 12), INCRA's immediate priority task is to establish an initial one hundred large settlement projects along the new road. In addition, INCRA is to continue with the activities of the two predecessor agencies.

3.4 Problems in Land Settlement: A few points of Reference

While an examination of some of the critical problems in

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[25] Estado de São Paulo, July 10, 1970, p. 4.

land settlement is the principal concern of subsequent chapters, brief attention here is focused upon the work of a number of other observers who have dealt with this subject, and whose comments are relevant.

Smith, in his work "Brazil, People and Institutions" attaches considerable significance to the role of the small family farm in the economic development of Southern Brazil. Smith writes:

> " One of the most significant effects in this more widespread distribution of landownership and control has been a rise in the general level and standard of living in the areas affected by the innovations. A glance at trends in production figures for the various regions in Brazil shows that during the last three decades a static and even decadent situation in much of the north has been accompanied by tremendous expansion along nearly all lines in the south. Educational progress and the determination to build a better Brazil also find their bulwarks in the southern area.
>
> One might multiply the details, but it would all add up to the fact that the development of a class of small farmers, with the consequent rise in the proportion and strength of the middle classes in south Brazil, is one of the more significant forces now pushing Brazil to the front among the nations of the Western Hemisphere."
> [26]

Few people would dispute Smith's observation about the economic disparity between the North and the South, nor can one deny the important contribution made by the large number of small farmers to the prosperity of that region of Brazil. However, the inference one is tempted to make, and seemingly one of the basic assumptions underlying the government's past and present settlement policy, that the promotion of the family farm in all parts of Brazil is the key to rapid rural development and prosperity,

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[26] Smith, Brazil, People and Institutions, p. 392.

may be seriously misleading.

Land redistribution and the establishment of Brazil's four million landless rural families on land of their own, could, in time, result in the amelioration of their presently miserable social and economic position. However, as will be shown in later chapters, the establishment of family farms in underdeveloped rural areas does not guarantee that the conflicting objectives of achieving rapid and simultaneous social and economic development can be reconciled. Moreover, while progress in Southern Brazil may at least be partially equated with a tradition of family farming, the relationship does not necessarily hold true for other parts of Brazil, where small, family-owned and operated farms are common as well.[27]

In transferring the methods of colonization that were developed and employed in the South of Brazil to other parts of the country, it is assumed that what was successful in one area will also be workable and successful elsewhere. This assumption is questionable, particularly since present-day colonization projects are being established in the hope that, in a matter of a few years, the new settler will become an efficient and relatively prosperous farmer.

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[27] Northeast Brazil, which is regarded as one of the most underdeveloped regions of the country, in 1967, had a total of 520,249 registered farms under ten hectares in size, representing 44.6 per cent of the total number of rural properties, and 499,664 farms of ten to one hundred hectares, representing 42.8 per cent of the total. By comparison, in Rio Grande do Sul, one of the Southern States, the percentage of farms in the two size groups, in 1967, was 35.6 and 57.9 per cent respectively. (Source: Instituto Brasileiro de Reforma Agrária).

The majority of the early settlers of the South were of European origin. While this does not provide grounds for any claims to superiority, their background, values, and attitudes favoured hard work and thrift, and were conducive to the type of development which Smith described. In extreme contrast, the landless peasant of today, often descendant of former slaves, illiterate and ignorant, malnourished, of poor health, miserable and often exploited, sees himself at the very bottom of the social and economic ladder, and engaged in an activity which society scorns and considers loathsome. If attached to the land it is in many cases only necessity which keeps him there.

Because of these very considerable cultural differences, and because of the complex and arduous task of developing not only agriculture but also human resources, the author does not believe, that the experience of Southern Brazil provides a relevant model for the agricultural and economic development of such backward regions as the Northeast.

Other relevant studies and reports on Brazilian colonization, include the work of Galjart, Lacerda de Mello, Andrade, and Pessoa and Coelho.

Galjart's recent study of the Colony Santa Cruz in Rio de Janeiro is the only detailed anthropological and socio-economic investigation of an individual settlement project, which attempts to identify some of the principal causes and obstacles impeding the development of such projects.[28]

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[28] Benno Galjart, Itaguaí, Old Habits and New Practices in A Brazilian Land Settlement, 1968

Santa Cruz was established in 1930, under the auspices and direction of the federal agency responsible for colonization at that time. The project is representative of many of the settlements established during the inter-war period, and does not differ greatly from the colonies created by INIC during the 1950's. The government divided the land, built roads, houses, schools, an administrative center, selected the settlers, provided credit and other forms of assistance, and administered the project until its emancipation.

The early settlers of Santa Cruz were poor, and many found it difficult to eke out even a meager existence. They cleared their land and sold the wood or made charcoal. Many found it difficult to establish firm roots and left the project. Others lived on the land, but worked elsewhere, for other settlers, for the administration, or outside the colony. Capital was scarce, although one administrator complained "if you gave them credit they ate it, and if you gave them seeds they ate that too".[29] Contrary to regulations, farms were being bought, sold, and exchanged. Galjart speaks of one non-resident "settler" who acquired as many as thirty farm lots in the project.

Galjart's observation concerning attitudes toward work, the land, profits and savings are noteworthy:

> "In the project, manual labour seemed to be despised, non-manual labour esteemed; the farmers did not seem to work very hard; changes in prices seemed to be followed promptly by changes in resource allocation; some opportunities for monetary profit (the

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[29] Ibid. p. 20

> quick cruzeiro) were readily taken; the settlers did not concentrate on their own food but on cash crops; apparently little affection was felt for the farm or the land; frugality, if it existed, was a necessity rather than a way of life, saving for a rainy day, foresight, seemed rare (and thus also that particular prevision called depreciation allowance)."[30]

Nevertheless, by the time the study was conducted in 1963, considerable progress had been achieved. Of 186 settlers interviewed, the author found that twenty-five per cent owned a truck or pickup, nineteen per cent owned a tractor, and as many as forty-eight per cent owned a pesticide sprayer. Galjart also found a fairly widespread acquaintance among settlers with progressive farming practices. Adoption or non-adoption of such practices seemed to be strongly related to the financial importance of the crops or animals involved, as well as to the more immediate considerations of the additional work and capital that would be necessary. However, Galjart feels, that despite considerable opportunities within the project, its agriculture was not very highly developed. From his description of the project it is evident that many of the traditional and deeply ingrained values and attitudes of the people in the settlement were slow to change.

Impediment to change and obstacles to development are partly explained by what Galjart calls the "Patronic Syndrome" and the "Grand Tradition".

The patronic syndrome is characterized by three elements:

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[30] Ibid. p. 26.

1. The assumption that any real improvement in one's socio-economic situation depends not so much on one's own efforts as on favours granted by secular or supernatural powers, or on a stroke of luck.

2. The disposition to seek to establish patronage relations with people who are, or in the future may be, able to do one a good turn.

3. The absence of feelings of solidarity towards people with whom one is not related by kinship, friendship or patronage. This absence is associated with a disbelief in the presence of such feelings in others.

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The author then proceeds to support his thesis by numerous illustrations from his study of inter-personal relationships in Santa Cruz.

The relevance of Galjart's observation requires little elaboration. If material success and achievement cannot be attained through personal effort, thrift, and confidence in one's own abilities, but are dependent upon external forces or circumstances over which the individual has little or no control, then personal effort is stifled. This belief, as Galjart points out, does not mean that people will wait, arms crossed for fortune to knock on their door, but it does mean that they are inwardly convinced that without luck or assistance from others there is no point in making a hard effort. "It implies the absence of that indomitable but also unscrupulous, almost cruel will to succeed that pioneers sometimes display." [32] He further points out that this attitude is not restricted to the poor, but that it permeates all levels of Brazilian society. He suggests that, what among the lower classes

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[31] Ibid. pp. 85,86.

[32] Ibid. p. 86.

is a belief in one's dependence on outside assistance, among the higher classes often becomes a disposition to use public funds, whose allocation they can influence, for private ends. Illustrative of this disposition is the ease with which planters and industrialists have traditionally looked to the government for relief in times of crisis.[33]

The failure of four attempts to establish a cooperative within Santa Cruz is also seen within the context of the patronic syndrome. Since most of the associations formed between individuals (other than those of kin and blood) have their basis in the expectation of benefits or favours, cooperative efforts demanding a different form of reciprocity are inhibited. The idea of the rural cooperative for the mutual benefit of a group is not foreign to the Brazilian peasant, and much effort is made by different government agencies to promote cooperativism among farmers. Yet, while the patronage system persists, the organized farm cooperative must remain somewhat of an incongruity.

Next to the patronic syndrome, attitudes and values which affect production and the allocation of resources have been influenced by what Galjart calls the "Grand Tradition". These include attitudes with regard to land and soil, crops, labour, and capital. The author illustrates the influence of the Grand Tradition in Santa Cruz.

He found that settlers placed greater emphasis upon land ownership than on the intensive cultivation of smaller areas. The more successful farmers who began with one plot, have over time assembled

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[33] Ibid. p. 87.

forty, sixty, and as much as ninety hectares of land, on which the production of livestock and labour-extensive cash crops is given preference over more profitable but labour-intensive food and vegetable crops. Livestock production is particularly favoured as being an activity of far greater prestige than that of growing crops. Work, if at all possible should be done by hired workers or share-croppers.

Settlers' unwillingness to assume long-term risks, a propensity to seek only quick profits, and the diversion of capital for trucks and additional land rather than for tractors and other, more productive inputs, are cited as further examples reflecting the influence of the Grand Tradition.[34]

Galjart's arguments of the importance of the Patronic Syndrome and the Grand Tradition find strong support in the contrasting attitudes of a small group of Japanese settlers in Santa Cruz. The Japanese were found to be consistently high adopters of innovations. They were usually working only one lot per family but very intensively, and specializing in annual crops. They were purchasing tractors and other mechanized equipment rather than trucks. They were bound by a strong sense of group loyalty among themselves, and were found to be thrifty, but unafraid to go deeply into debt to farm properly.

The following is a synthesis of some of the pertinent recommendations for future land settlement projects emerging from Galjart's study:

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[34] Ibid. pp. 115-134.

1. The field of action of the administering agency must be comprehensive and embrace, in addition to agriculture: education, extension, credit, marketing, and medical care.

2. The staff in the field should be rewarded for being in the field instead of sitting in some metropolitan office.

3. The agency should organize a cooperative and operate it for several years.

4. In the absence of charismatic leaders, the best alternative is institutionalized patronage. The agency which executes the project should not leave it, but stay on as its official patron. The power to intervene and to put an end to undesirable developments should not be relinquished too soon.

5. The agency should institute a recurring evaluation of its own performance. Evaluation should be carried out regularly and the findings should lead, if necessary, to changes in administrative policy. The participation of sociologists in such evaluations should be considered.[35]

Lacerda de Mello, addressing some of the specific agricultutal problems of the Northeast: monoculture, food deficits and high demographic density in the coastal region, extensive and primitive agriculture in the interior, widespread rural poverty, and many uncoordinated efforts to improve the system, sees land redistribution and colonization as a viable means to implant a planned system of rational agricultural exploitation.[36]

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[35] Ibid. p. 113, 140, 141.

[36] Mário Lacerda de Mello, "A Colonização e os Problemas Agrários do Nordeste", Boletim do Instituto Joaquim Nabuco, V. 10, (1961) pp. 5-36. (Lacerda de Mello's account is not based upon a specific research project, but upon a life-time of study and geographic field work in the Northeast).

Colonization projects should be established in certain carefully selected strategic areas. The aim of such a program of settlement would be the following: to achieve a more equitable distribution of the land, to reduce migration to the cities and to firmly establish rural families on the land, to raise their levels of living, to encourage the rational use of land, and to meet the food demands of growing urban centers. The realization of these goals would require not only the expropriation and redistribution of extensive areas of land but would also depend upon the creation and efficient functioning of a complex organization that is capable of promoting change in all areas and phases of such a program.

Aware of the many problems that have arisen out of past land settlement efforts, Lacerda stresses the need for a comprehensive plan which, among other elements, takes into consideration the ecological characteristics of each region and develops production and land use plans accordingly. Other basic problems demanding special study and attention relate to the settler, his limited farming skills, his lack of education, his poor nutrition and health and his limitations for sustained physical effort. Attention would also need to be given to the careful selection and training of the administrators of the projects and programs. He feels that it is not enough that they be specialists with scientific and technical training in their respective fields, but that they also must have enthusiasm, a deep sense of devotion, and a fair share of missionary spirit.[37]

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[37] Ibid. p. 24.

Finally, Lacerda emphasizes the need for careful location analysis prior to the selection of settlement sites. He suggests that the failure of previous projects can always or nearly always be traced to errors in location.[38] Andrade supports this argument and, like Lacerda, is critical of past settlement efforts because the location of many colonies was simply dictated by the availability of land rather than by local and regional needs and by consideration of many of the factors basic to the success of such projects.[39] In the opinion of both authors settlements should be concentrated in proximity to the large coastal cities of the Northeast, as well as near important regional centers of the interior. Only after this objective has been met, should thought be given to the creation of colonies in more remote areas.

The report by Pessoa and Coelho[40] is based upon the previous experience and work of the two authors in the field of government-sponsored land settlement. The report was primarily intended to establish some policy guidelines for SUDENE. However, it contains a number of relevant and instructive comments and observations about the failure of past colonization efforts. These are summarized as follows:

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[38] Ibid., p. 29.

[39] Manoel Correia de Andrade, A Terra e o Homem no Nordeste, (São Paulo: Editora Brasiliense, 2. ed. 1964) pp.227-243.

[39] Dirceu Pessoa, Jorge Coelho, Colonização e Reforma Agrária, Subsídios para uma política de colonização agrícola para o nordeste. SUDENE, Divisão de Documentação, Recife: 1965.

1. Excessive costs in relation to the benefits of projects. Causes include: excessive numbers of often unqualified administrative personnel; excessive investments in installations and equipment which subsequently remain underutilized; excessive paternalism toward settlers, eg. charging only token fees for the rental of equipment without consideration of maintenance costs and the need for eventual replacement, etc.

2. Poor planning of health and educational services, and discontinuation of such services after settlers have come to accept them.

3. A philosophy of excessive paternalism, inhibiting the development of personal initiative and a spirit of mutual assistance and cooperation.

4. Political interference in such critical areas as site selection, the hiring of administrative and technical personnel, the provision of technical, financial, and social assistance and services, to the point where the project may become completely paralyzed.

5. Administrative obstacles and bureaucratic entanglements, eg. delays in the release of funds, rigidity in their application, obstructiveness in the hiring of qualified personnel and the dismissal of personnel unsuited for the work.

6. A lack of a rational, comprehensive, long-range plans, demonstrating economic feasibility and justification for projects.

From this, rather limited discussion of some of the literature dealing with various aspects of land settlement in Brazil it is clear that relevant ideas and insights are not lacking. Unfortunately, as will be evident in later chapters, few of these ideas seem to have had much practical consequence in solving the problems of existing settlement projects or, more important, in bringing about a greater flexibility in the planning, implementation, and administration of new projects.

IV

METHODOLOGY

4.1 Research Objective

The purpose of this study was to inquire into the principal causes of the success and failures of seven representative colonization projects in the coastal region of Northeast Brazil, and to provide a basis for the formulation of more reliable planning criteria and implementation procedures for future colonization activities to be carried out in this region.

Because of the paucity of available data and of previous research, the study was of necessity fact-finding and descriptive, aiming at the identification and analysis of major problems in land settlement, rather than the testing of specific hypotheses or the elaboration of theories.

To achieve this research goal, a model was established which embodies the basic government objectives for planned land settlements and which provided the common terms of reference against which projects were evaluated. The examination of each project then focused upon the development and general characteristics of the settlement as a social, economic, and administrative unit, and upon the individual settler, his past and present socio-economic status, and his achievement in the light of the economic opportunities presented to him.

4.2 Research Design

The study's aim to seek relevant answers to current problems in land settlement provided justification for an attempt to draw as fully as possible from past experience, and for the decision to select as many as seven major projects from the Northeast coastal region for examination.

The criteria employed in the selection of projects were the following:

1. That the project be located in the humid coastal region of Northeast Brazil. (Most of this region has been designated as "agrarian reform priority area"; under the GERAN program some eighty-eight new settlement projects are proposed for this region.)

2. That the project has been in existence for at least five years. (Preliminary studies by the author indicated that a settler requires approximately five years to bring the maximum amount of land under cultivation which he and his family can work effectively, hence, a settlement project should reach a near equilibrium production level within five years from the time settlers receive their land.)

3. That the project has not been emancipated, i.e. that it is still under the administration of a colonization agency. (This condition was considered relevant to the type, quantity, and quality of services offered and their effects upon the development of the project.)

4. That each project represents the work of a different public or private settlement agency.

Initially, six major settlements were selected from among eleven projects located in the coastal region of the states of Paraíba, Pernambuco, Alagoas, and Sergipe. These included the Colony of Camaratuba, a state government project in Paraíba; the CRC Colony at Cabo, a state government project in Pernambuco; the Colony of Tiriri, a project initiated by SUDENE, also located in Pernambuco; the Colony of Rio Bonito, a federal government project in Pernambuco; the Colony of Pindorama, a private project in Alagoas; and the Colony of Treze, a project sponsored by the Bank of Brazil and located in the State of Sergipe. A seventh project, the CRC Colony of Vitoria in Pernambuco, established by the same colonization agency as the CRC Colony of Cabo, was included in the survey as a matter of courtesy to the agency, which felt that its project at Vitoria was the more successful of the two colonies, and therefore should have

been the one singled out for study. Not included in the survey were the large INCRA project of Caxangá and the INCRA project Rio Tinto, both of which were established very recently, and two very small, and virtually abandoned colonies, which were established by different private groups some fifteen years ago.

To provide constant terms of reference for the evaluation of projects and to assure a measure of uniformity in the collection and analysis of data, a model was established which embodies the basic government objectives for planned land settlements and which are pertinent to the seven projects that were examined. The following basic objectives were identified:

1. To improve the level of living, housing, health, and education of the settler and his family, and to provide the opportunities and conditions necessary for his own progress.
2. To firmly attach man to the land.
3. To promote the rational exploitation of land resources.
4. To contribute to regional economic growth through
   a. taxes paid by settlers.
   b. increased consumer buying power of settlers.
   c. contributions to the food supply of urban centers and the elimination of regional food deficit of farm products which can be locally produced.
   d. linkage effects and the generation of additional employment and income in agricultural supply and processing industries, as well as in the service sector

While objectives two, three, and four are fundamental and are frequently cited justifications for the large investments required in the establishment of settlement projects, it is evident that the achievement of each of these objectives is directly related to the achievement of the first and most important of the settlement goals listed above. Participation in the regional economy, the rational exploitation of land

resources, and man's attachment to the land represent goals all of which imply and require a certain level of economic performance and income on the part of the individual settler and of the settler community, whose collective performance will affect the outcome of the settlement venture. The settler's income, attributable to his own productive efforts and the opportunities available to him, is also the basis for sustained improvements in his level of living. From this it follows that any inquiry into the success and failures of any settlement effort should focus upon the individual settler and his economic performance in the light of the opportunities presented to him, while the opportunities and choices available to him clearly involve a broader consideration of the project itself.

Economic performance was assessed on the basis of settlers' annual income and estimates of returns to family labour. Settlers' income position was compared against an income model in which the minimum annual gross income required by the typical Northeast settler family was established. The model takes into consideration expenditures for food and other family expenditures, property debts, savings and requirements for farm improvements, and cash operating expenditures.

The average settler family was assumed to consist of two adults and five children, which corresponds to current statistics of average family size for the rural Northeast. This value was also found to be representative for the families living in the seven projects.

In calculating family food expenditures, achievement of an adequate minimum diet was considered essential. Food requirements were established on the basis of average calorie needs for adults and children living in the Northeast, as determined by the Pernambuco Institute of

Food and Nutrition (cf. Table A18 Appendix). It was assumed that the family would always purchase the cheapest food per unit of calorie and nutritional value. It was also assumed that the settler would be self-sufficient to the extent of at least thirty-five percent of the total value of food consumed by the family. On this basis, the total value of food consumed by the average family, over a twelve-month period, was estimated at U.S.$710 of which sixty-five percent or U.S.$462 represents the value of the food which the family must purchase.

Family expenditures for shoes, clothing, household items, transport, and medical expenses were estimated at U.S.$144 per year.

In virtually all planned land settlement projects in Brazil, settlers are required to pay for the land, housing, and other investments made on their behalf. In the past, typical settlement costs in Northeast Brazil have ranged from U.S.$2,000 to $5,000 per family. Assuming an average debt of U.S.$2,500 per family, to be paid off over a ten-year period (normally without interest or monetary correction), the settler's annual liability would be equal to U.S.$250.

To allow for farm improvements and unexpected family expenditures, a minimum of U.S.$200 per year was considered necessary for investments and savings.

Finally, cash operating expenditures, including interest on credit, the cost of purchased farm inputs, and the cost of some paid labour, were estimated on the basis of thirty percent of the required annual gross income, or a total of U.S.$452. The total annual gross income required would thus be equal to U.S.$1,508, summarized as follows:

1. Food Expenditures	U.S.$	462
2. Other Family Expenditures		144
3. Annual Debt Liability		250
4. Investment and Savings		200
5. Cash Operating Expenditures		452
Total Annual Gross Income Required	U.S.$	1,508

Thus, it was assumed that in the typical planned land settlement project, most settlers would need to achieve a minimum annual gross income of U.S.$1,508 to guarantee a satisfactory level of living for the individual family, and to assure the viability and success of the project. In the project, where investments per family have been less than U.S.$2,500, or where settlers achieve a greater degree of self-sufficiency in family food production, this minimum annual income requirement would be somewhat lower.

While the income model provides a fixed benchmark against which settlers' present income position can be compared, improvements in levels of living, health, and education, to be brought about by colonization, imply a change, relative to settlers' economic and social position prior to settlement. To assess these changes, settlers were asked to compare their situation before and after settlement with respect to the following:

1. their ability to feed and clothe their family
2. the availability of health services
3. educational opportunities for their children
4. housing conditions

Their response to these questions was to provide further indication of the extent to which the first and most crucial objective of colonization has been achieved.

No attempt was made to treat in detail the remaining three objectives of colonization, i.e. to attach man to the land, to promote the rational exploitation of land resources, and to contribute to regional economic growth. However, an evaluation of the seven projects, to be discussed in subsequent chapters, will permit commentary and certain conclusions as to the extent to which these objectives have been attained. These conclusions are considered in Chapter Eleven.

Since the study was also concerned with the identification of the variables which influence the performance of the individual farm and of the project, a consideration of the characteristics of the project itself was necessary. No attempt was made at marginal economic analysis to determine an optimum production situation for settlers within each project. Instead, each project is treated descriptively, with emphasis on its history and development and the conditions and economic opportunities existing at the time of the survey. This is followed by a discussion of the agricultural practices, activities and incomes of settlers, and of the extent to which these reflect the previously discussed conditions.

4.3 Data Collection

Data were obtained both at the project and at the farm level. At the project level, information was sought about the objectives of the project; its history and development; its present administration; services provided to settlers; the availability and cost of farm inputs; farm product prices paid to settlers; regulations governing the conduct of settlers, contractual arrangements, and the distribution of land titles;

about agricultural productivity and production; the total volume of annual sales; and about various other aspects. In most colonies information was also obtained from agency records about total annual sales of principal cash crops of those settlers who were selected for detailed interviews. Information about each of the seven projects was collected by means of informal interviews with field and office staff of the respective settlement or administrative agency, by examining agency records to the extent available and accessible, and by drawing on various other sources.

Data at the farm level were obtained through detailed and systematic interviews with ten percent of the settlers in each project, selected at random from the roll of the settlement agency. Since in all projects lots are numbered, random selection was facilitated by using tables of random numbers. Because the data were not intended for rigorous statistical analyses, sample size and guarantee of randomness were considered important but not critical parameters.

Interviews with settlers were standardized through the use of a pre-tested questionnaire, a copy of which is included in the Appendix. The questionnaire was designed to obtain general biographical data about the settler and his family; to obtain information about his life, level of living, and agricultural background and experience prior to colonization; about his early experience in the project; about his level of living, agricultural practices, activities and income for the twelve months preceding the date of the interview; and about his perception of his general situation within the colony with respect to the past, present, and future.

The farm interviews were conducted by three young technicians who had a rural background, held diplomas from schools for vocational agriculture, and who were selected from twenty-five candidates who had applied. The collection of farm data commenced during the last week of January of 1970 and was completed by the beginning of April. The survey team, consisting of the three interviewers and the author, spent from four to ten days in each of the seven projects. While the interviewers, who worked individually, were engaged in the collection of farm data, the author talked to field staff of the settlement agency, and obtained information from the records of the local project administration or from the project cooperative. In each project, the author also conducted several informal interviews with settlers that were not included in the sample. Some of these interviews were conducted alone, others with the help of one of the three technicians. After this initial phase of the survey and after the completion of a preliminary analysis of the data, the author returned once more to each of the seven projects to obtain additional information, where necessary, and to make further observations about farming activities.[1] This second phase of the survey was carried out between May and August of 1970.

4.4 Data Analysis

Data obtained from questionnaires were organized into quantitative and non-quantitative variables. Quantitative variables such as

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[1] Because of difficult road conditions in many projects during the rainy season, and because settlers are least occupied during the short inter-phase between planting and harvest time, in January, February, and the early part of March, interviews were scheduled for this period.

settler's age, number of children, etc. required only simple tabulation. However, conversions were necessary for many economic variables. Local area measurements such as the tarefa and the conta had to be converted into hectares. Measurements of weight used by settlers, such as the cuia and arrôba were converted into kilograms. Settlers' statements of annual incomes, of which they were frequently uncertain, were checked against the areas planted by each settler during the past production year, against his yields, against his volume of production sold, against local prices, and against the records of the local administration. Minor upward or downward adjustments in the annual gross income of individual farms were made where it was felt that this procedure was necessary. These values were then converted from cruzeiros into U.S. dollar values, using the same exchange rate of U.S.$1.00 to Cr$4.50 in all cases.

All non-quantitative data were coded by determining the range of responses provided by settlers, and by devising suitable response categories. For many questions, only simple categories such as "yes" or "no" or "don't know" were necessary.

All data were transferred onto standard eighty column computer cards for the preparation of summary statistics and simple cross tabulations. Analyses were performed on a CDC 6400 digital computer. A list of all variables and summary statistics for all quantitative and non-quantitative variables is included in the Appendix. (Tables A1 to A16). These data were used primarily for reference purposes and to document statements made in the discussion of each project.

4.5 Limitations

The study suffers from many obvious limitations. In an attempt

to obtain a general picture about the characteristics of seven, fairly large settlement projects, relevant details, that might have come to the fore had the study been more limited in its scope and focus, suffered. On the other hand, because of the lack of useful and relevant previous information about settlers, the questionnaire employed in this study was perhaps overly ambitious, and only a portion of the data that was obtained could be used effectively.

In the collection of information from settlers, respondents often found it difficult to provide the information requested. While settlers were always informed of the purpose of the survey, they were often afraid to speak freely, and much time was spent by interviewers just in establishing the necessary rapport. In one project, a local priest who had worked among settlers encouraged them to resist the government's effort to establish a cooperative, and told them that all cooperatives are corrupt. When approached with the interview, settlers had to be reassured that the survey was not intended to furnish information for the establishment of a cooperative. One of the questions in the interview schedule required an expression of opinion about agronomists. In virtually all of the author's informal interviews, settlers' response was positive. In the regular interviews conducted by the three technicians, the response was highly variable. Settlers who thought that the interviewing technician might be an agronomist or a representative of the agency, often provided the response they felt was safe and appropriate. Other biases were introduced by the limited skill of the interviewing technicians, by rephrasing questions which the respondents did not understand, and

perhaps by erroneously providing them with examples of possible answers. Supervision and orientation of interviewers throughout the survey reduced the seriousness of these problems; nevertheless, they need to be recognized as such.

Information requested from settlement agencies and other organizations often was unavailable or inaccessible. Verbal accounts given by different informants on similar questions were often found conflicting.

While elaborate quantitative analyses were purposely avoided, reliance upon average values and upon the "best data available" in many of the simple calculations that were performed, had its obvious limitations.

In providing a historical account of each project, it was often necessary to rely upon verbal rather than printed sources. An accurate assessment of the project costs, in most cases, was all but impossible. The conversion of cruzeiro values into dollar figures is not without hazards, and at best a compromise to make the former intelligible.

Finally, conducting research in an environment which, initially at least, is alien to the observer, is fraught with many problems of which the researcher's own cultural and personal biases are unquestionably the most formidable.

Despite these limitations, the author is confident that the study will serve its purpose of elucidating some of the major factors

underlying the success or failure of the projects that were studied.

V

THE COLONY OF CAMARATUBA

5.1 History and Development

The Colony of Camaratuba, not unlike many other settlement projects in the Northeast, owes its existence to contingent circumstances and events rather than to any specific desire on the part of the government of that time to pursue colonization.

The colony was established in 1936, with the purchase, by the State of Paraíba, of an old sugar engenho, comprising some 6,510 hectares of land. Previous ownership of the property and the reasons for its transfer to public trust are obscure, although the accounts of various informants suggest that the government was able to acquire the property because of a long history of disputes over the rightful ownership of the land.[1]

A large portion of the property was covered with a valuable stand of tall tropical forest, which was threatened, however, by the moradores (squatters) living on the engenho, who were making charcoal and practicing slash and burn agriculture. The government's plan was to establish a small colonization project for some sixty four families, and to exploit the area's timber resources as a source of revenue and for public work projects.

The project is located in the município of Mamanguape, which forms part of the densely populated hinterland of João Pessoa, the state capital, some seventy-eight kilometers to the southeast (Fig. 3). The

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[1] Apparently, the property had at one time been donated to the church with subsequent claims and repossession by the descendants of the benefactor.

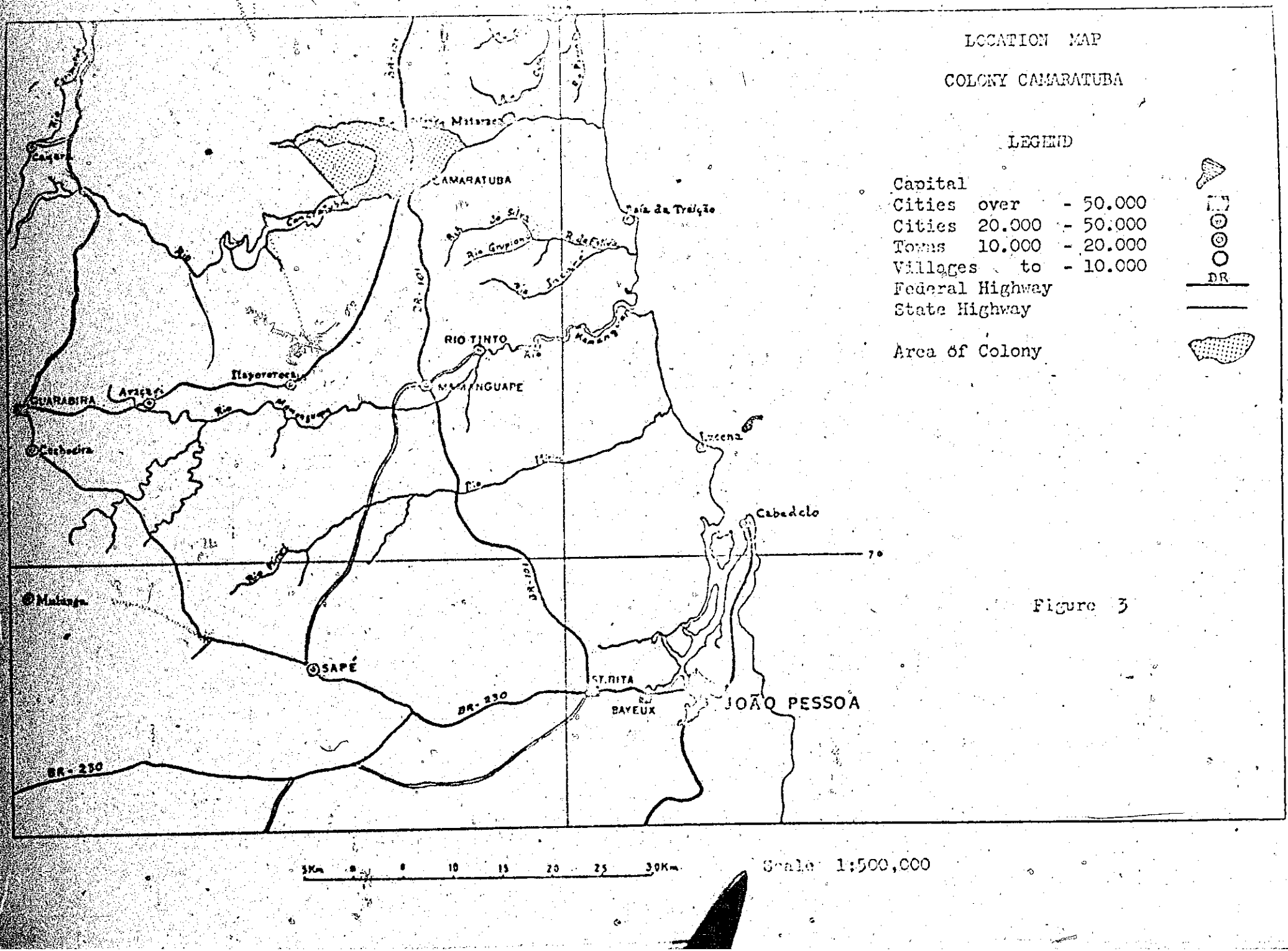
LOCATION MAP
COLONY CAMARATUBA
LEGEND
Capital
Cities over - 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to - 10.000
Federal Highway
State Highway
Area of Colony
CAMARATUBA
RIO TINTO
MAMANGUAPE
ITAPOROROCA
ARAÇAGI
GUARABIRA
CACIMBA
LUCENA
CABEDELO
MALTA
SAPÉ
ST. RITA
BAYEUX
JOÃO PESSOA
BR-230
BR-101
Rio Mamanguape
Rio Gurinhem
Rio Sanhauá
Rio Paraíba
Rio Miriri
Rio Mataraca
Baía da Tracição
7°
5Km 0 5 10 15 20 25 30Km
Scale 1:500,000

Figure 3

nearest towns are Jacaraú, fifteen kilometers west of the colony, Mataraca, eight kilometers to the east, and Mamanguape, the municipal seat, some twenty-three kilometers to the south. The population of the portion of the coastal region of Paraíba shown in Figure 3, in 1970 was estimated to be close to one million, of which approximately fifty-five per cent live in rural areas.[2]

The agriculture of the region is characterized by the production of sugar cane on large plantations, which are found in several broad valleys lying between the brush and forest-covered tabuleiros along the coast, and by livestock grazing, the production of sisal, pineapple, beans, corn, and manioc, on smaller properties along the coast and further inland. Most of the land is held in large latifundium-type properties, but there are also many small farms, and renting and sharecropping arrangements are common throughout the area.

Access to the colony is by Federal Highway BR-101, which is the paved coastal highway, and which cuts through the project for a considerable distance. There are also numerous secondary roads. Few of these are paved, but most are passable by motorized vehicles throughout the year.

The area of the colony consists of a large sandstone mesa or tabuleiro, which rises some two hundred feet from the broad valleys of two important streams, the Rio Pitanga and Rio Camaratuba. These form the northern and southern boundary of the project, but converge in the

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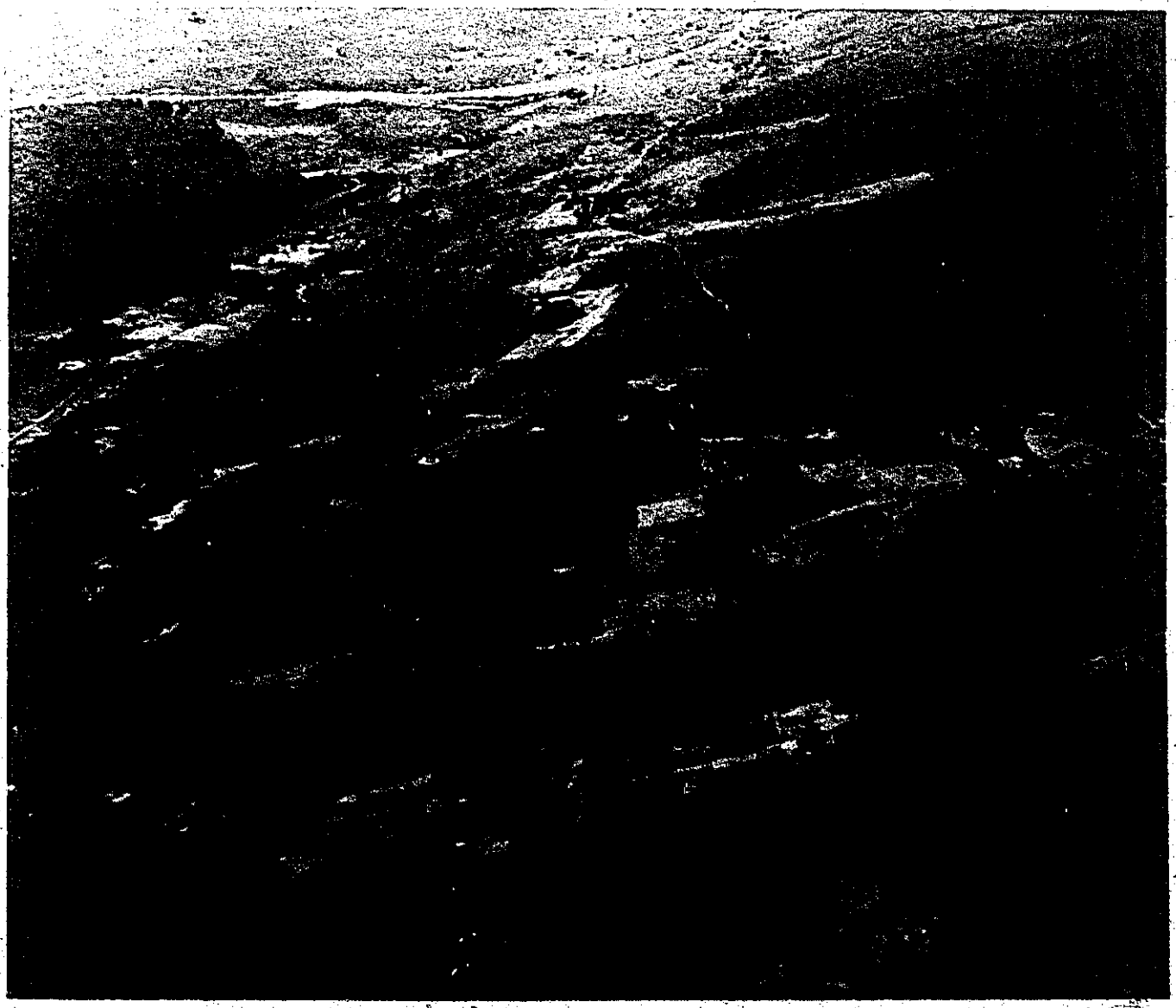
[2]Estimate by the author, based upon 1968 population statistics (Instituto Brasileiro de Estatistica, Laboratório de Estatistica, Estimativa de População para os Municipios Brasileiros, 1º de Julho de 1968, IBGE, Rio de Janeiro, April 1969, pp.19-21)

east, giving the area a roughly triangular shape.

The table land is comprised of some 3,000 hectares of forest and brush-covered terrain. The soils here are sandy, excessively drained, and unsuited for agriculture. Roughly 2,910 hectares of land make up the gentle slopes rising from the edge of the two valleys to the top of the mesa. The slopes are largely covered with degraded forest, capoeira (light brush), though, here and there, small patches of land are devoted to the production of subsistence crops. The soils here are coarse and sandy, but contain some clay and organic material.

The remaining six hundred hectares include the lower, very gentle valley slopes, and the floodplain of the two streams. The lower slopes have generally dark, friable, and well-drained sandy soils, that have a higher clay fraction than on the upper slopes, and tend to be more fertile. Crop production is concentrated in this area. The floodplain of both streams is usually inundated for one to two months during the peak of the rainy season. The soils are, for the most part, hydromophic. The vegetations consists of light brush, sedges, and tough grasses. The land is used for grazing, but occasionally also for the production of manioc, beans, and corn, during the dry season.

Climatic conditions in the area reflect the general climatic characteristics of the Northeast coastal regions, of which an alternating wet and dry season is the most prominent feature. Mean annual rainfall at the nearest meteorological station at Mamanguape is 1,534.7 mm (60.4 inches). Mean annual temperature is 24.6°C. The rainy season extends from mid-February to mid-August, with an average monthly precipitation



Aerial View of the Rio Pitanga Valley, Camaratuba.

of 109.8 mm in February and a peak average of 262.1 mm in June. The driest month is October with an average of 22.4 mm, increasing to 32, 56 and 81mm in November, December, and January, respectively. The area lies outside the so-called drought polygon, and hence is not affected by the prolonged droughts which often plague areas further westward.

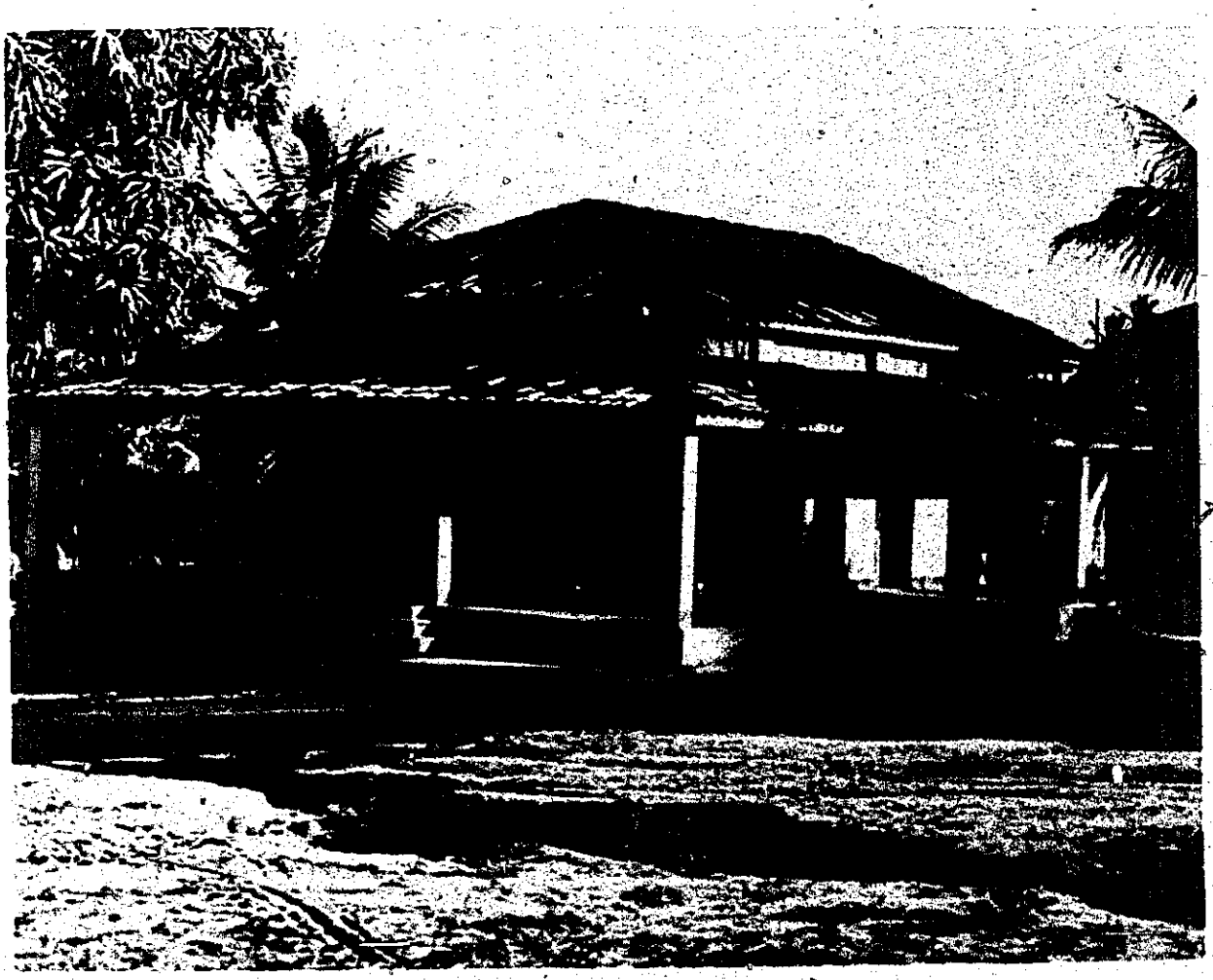
After the State of Paraíba acquired the property, in 1936, the land was turned over to the Department of Public Works and Agriculture, which was charged with the implementation and subsequent administration of the project.

From the basic layout of the project, the facilities that were constructed, and the size and distribution of parcels, it is evident that the government adhered very closely to federal regulations and procedures governing such projects. However, in several important aspects, the state government departed from these directives. No provisions were made for the eventual distribution of land titles to settlers, nor were settlers expected to pay for the houses that were constructed for them and for various investments made in the development of infrastructure. Tenure of settlers in the project was conditional upon good behaviour, and upon rendering one day per week of unrenumerated service in logging operations or sawmill work or in other activities at the discretion of the administration. In addition, settlers were required to pay to the administration a tax of ten per cent of their annual production of manioc flour. This tax is paid in kind, and is known as conga.

The physical layout of the colony consists of a service and administrative center, a small experimental station, two major service roads running parallel to the direction of the two valleys and converging near the eastern boundary, and of several groups of adjoining lots, interrupted by areas of poor land which were considered unsuitable for settlement.

The service and administrative center is located near the southern boundary of the project, and a few hundred meters east of Federal Highway BR-101 which traverses the colony. Overlooking the center, and perched half way up the tabuleiro slope, is the director's residence, a large brick house, encircled by a veranda, and vaguely reminiscent of the casa grande, found on many of the engenhos and sugar plantations of the region. The center itself contains fifteen residences for administrative personnel, teachers, and workers employed in the project. There are also a school house, a chapel, a cooperative center, a machine shed and repair shop, an animal stable, a warehouse, as well as a number of smaller buildings. All of the residences and buildings of the center were originally supplied with water and electricity from the colony's own reservoir and generating station. Sixty-four hectares of land were set aside near the center, for demonstration and experimental purposes, and to provide small garden plots for families living in the center.

The project was provided with a tractor and a complete range of implements, a small hammermill for preparing animal feed, and a herd of bulls and cows for breeding purposes. A sawmill, one of the important installations during the early days of the project, is located a small



Cooperative Center at Camaratuba

Camaratuba

Settler's House

distance from the center. A second school was built in the Rio Pitanga Valley, in the northwestern part of the colony. Throughout the project, at nearly regular intervals, a total of eight casas de farinha (small manioc processing mills) were established.

The sixty-four farm lots, each of which is ten hectares in size, are strung out at irregular intervals, and at right angles to the direction of the road and stream of each valley. Each lot begins at the edge of the stream and extends upward to the middle and sometimes to the top of the tabuleiro slope. The typical lot is a hundred meters in width and one kilometer in depth. Some lots are wider and shorter. Lots are adjoining, but there are several areas in both valleys that were considered unsuitable for settlement, with the result that farm lots actually form several discontinuous groups.

Settlers live on their lots, and all sixty-four residences were constructed by the government. Houses are located a few feet off the edge of the service road which cuts across each lot. They are simple, but well-built and spacious brick structures with tile roofs. Each house contains a kitchen with a raised fireplace, two bedrooms, and a living room. Water is obtained from shallow wells near the house. The provision of sanitary facilities was left to the ingenuity of settlers.

No information could be secured about the criteria that were used to select the original sixty-four settlers. Although, from the information provided by one settler who has lived in the project for twenty-seven years, it would appear that most of the original families were selected from among the many moradores already living on the engenho

at the time the government took possession. The present composition of settlers by previous place of residence is fairly heterogeneous. Nine settlers were interviewed of whom four came from neighbouring municipalities of the coastal region, four came from the Agreste, and one had migrated from the Sertão.

The project was entirely financed and implemented by the state government, which also provided for the continued administration of the colony. Records which might provide clues about project costs and about the profitability of the forest and agricultural operations during the early days of the colony were not available and may not exist. Except for the fragmentary and often conflicting accounts of some of the older families of Camaratuba, very little information could be gleaned about the early history of the colony. Those who were willing to talk, said that conditions in the colony have always been "péssima" (very bad), but that they can make a living.

An attempt in 1962, by SUDENE, the then newly-created Superintendency for the Development of the Northeast, to revitalize the project and to place it on a sound economic footing, ended in failure. However, SUDENE's feasibility study[3] provides some interesting insights into the conditions which existed in the colony at that time, and also provides a basis for comparison with conditions in 1970.

At the time of SUDENE's survey, which was conducted during the latter part of 1961, Camaratuba had sixty-four official settlers who occupied 640 hectares of the best land in the colony. Owing to the lenient

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[3]Plano de Aproveitamento de Camaratuba, Mamanguape, Paraíba, SUDENE, Divisão de Documentação, Recife: 1962.

work requirements[4] in the colony, over the years, a large number of moradores were attracted to the area. By the end of 1961, the number of morador families living in the project had reached 214. The administration took a generally permissive attitude. Moradores were assigned parcels of land, two to four hectares in size, in the areas that had not previously been settled. Some of the moradores also became hired workers for regular settlers. They were allowed to construct their own mud houses on the land allotted to them. While they received less land and land of generally lower quality, they were also required to contribute one day of gratuitous service every week, as well as pay the ten per cent conga on the volume of manioc flour processed.

Because of the large number of families living in the colony, and because of a decline in the logging and saw-mill operations, the one day work rule (cambão), by 1961, had all but broken down. The regular settlers considered themselves superior in status, and many instead of providing the required cambão, sent moradores to do their work. This was tolerated, because the administration always seemed to have more workers than it could supervise and keep effectively occupied. To take care of this excess, the free labour was employed in road maintenance work, and in the cultivation of a portion of the sixty-four hectares of land which had been set aside for demonstration and experimental purposes.

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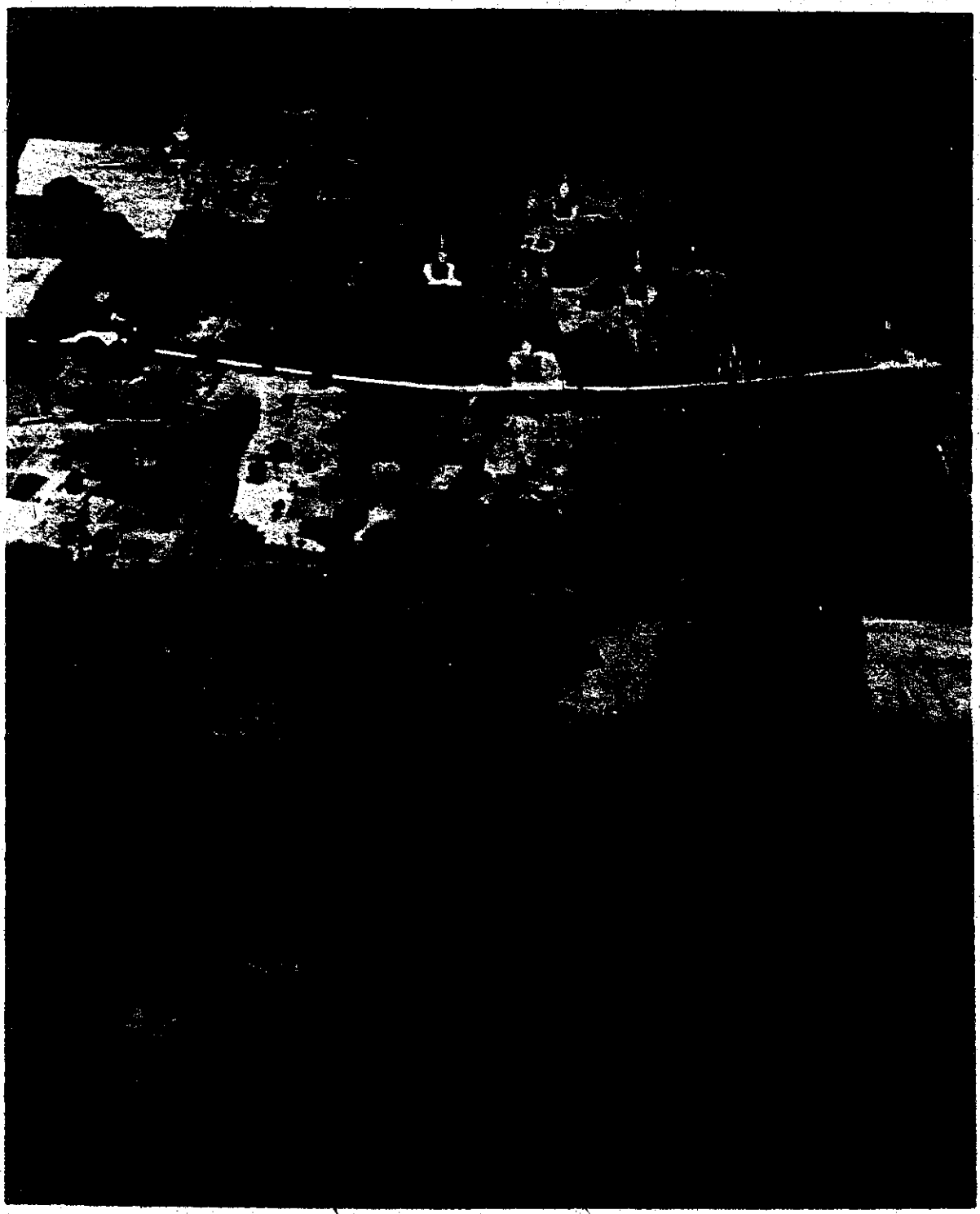
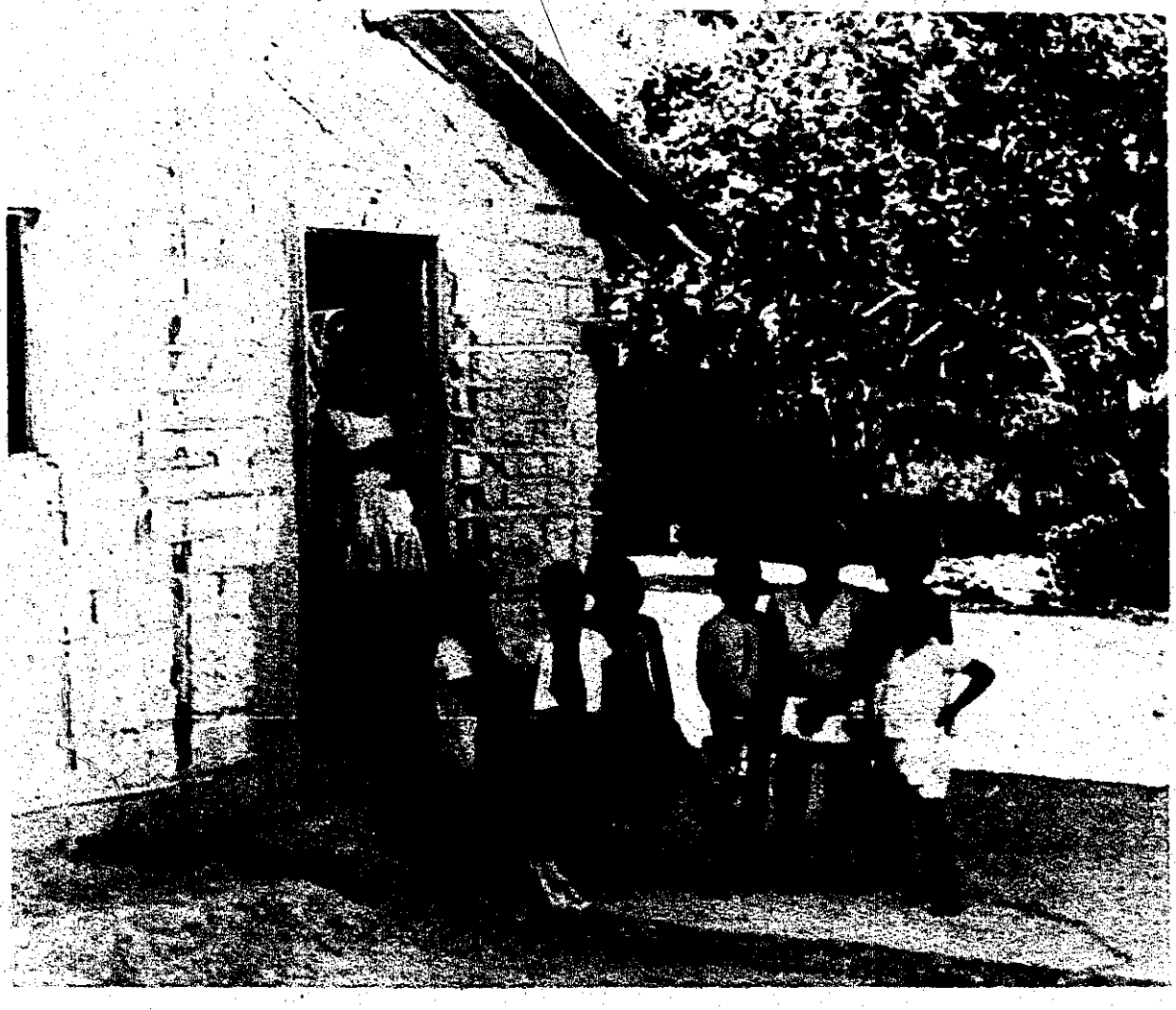
[4] i.e. providing one day of free labour in lieu of paying rent. On other fazendas in the region, moradores normally were required to work two to three days a week for the landlord in exchange for the right to cultivate a small parcel of land.



Camaratuba

Three to Four Moradores Share the Amount of Land Normally Allocated for One Family in Other Parts of the Colony



Camaratuba

Morador Family in Front of their House, "a Casa de Taipa"

SUDENE found little evidence of social integration of settler and morador families into a harmonious community group. SUDENE attributed this to the heterogeneous composition of the group in terms of origin as well as status within the colony, to the physical isolation of families, and to lack of interest on the part of the administration to promote social development.

The two schools in the colony functioned only on a half-day basis, and the buildings were not used for any other activities. The chapel in the center was used only once a month to celebrate mass. The mass was held by a priest who was a foreigner, who didn't live in the colony, and who knew few of the families he was trying to serve. A settlers' cooperative which had been founded in 1943, for the purpose of selling farm supplies and farmers' products, functioned only as a general store, and was managed entirely by the local administrative staff, and without any participation of settlers and moradores who were members.

The local administrative staff consisted of a director, a clerk in charge of the cooperative, two field supervisors, two chauffeurs, and two night watchmen. In addition, there were nine permanent labourers or pessoal para obras. While all members of the local staff were provided with free housing, and small garden plot, their wages were extremely low, and hardly offered much incentive for extra effort or dedication to the progress of the colony. The director received a monthly wage equal, at that time to U.S.$60. Other administrative staff were paid from U.S.$15 to $20 per month, while the salaried workers (pessoal para obras) were paid a daily wage of U.S.$0.35, an amount

equal at that time to the price of two kilos of beans.

To assess the economic situation of the project, SUDENE had to rely upon its own survey data. At the end of 1961, the total inventory of material capital of the project was estimated to be equal to U.S.$79,883. Of this amount, U.S.$72,133 represented the value of the building inventory, including the houses of settlers and moradores, and U.S.$7,750 the value of machinery and agricultural equipment.[5] No estimate is given for the value of the land.

In establishing the colony, the government expected that the project would not only be self-sustaining financially, but would also generate a modest profit. In 1961, this goal was not achieved. Total administrative expenditures for that year were U.S.$5,249, while the total revenue from the conga, the sale of some lumber, and of agricultural products from the demonstration farm was only U.S.$1,928.

The economic position of settlers and of moradores was found equally discouraging. The major crops produced included manioc, yams, squash, beans, and corn, as well as a variety of tree fruits. A few settlers had a few head of cattle, although both settlers and moradores had chicken and goats, and in some cases a donkey or a horse. No fertilizer was used, and the implements and machinery to be available to farmers, were in a bad state of repair. The hoe was the only tool used

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[5] Calculated on the basis of the Dec. 1961 exchange rate of U.S.$1.00 to 300 cruzeiros.

to work the land. The rotation system practiced by settlers and moradores was haphazard and completely inadequate to allow for the natural restoration of the land. Every year, a small portion of the total cultivated area would be allowed to lie fallow for two or three years, while a new area which had been fallow, would again be planted to crops. Because of the limited area of arable land on each parcel, a complete rotation in which all crops are shifted every year unto previously fallow ground, was not possible. Faced with declining levels of productivity, settlers and moradores resorted to the forbidden practice of forest burning. Some also used the poorly drained floodplain in an attempt to maintain or increase their production.

SUDENE estimated the average annual gross incomes of settlers for 1961 at U.S.$316, and the average gross incomes of moradores at U.S.$105. These incomes, SUDENE felt, could be increased several times by introducing improved farming practices and modern farm inputs, and by developing an effective marketing mechanism, with sales directly at João Pessoa and other cities of the region. The survey found that farmers in the project were poorly informed about market prices outside the colony, furthermore, that they were completely dependent upon middlemen, who bought at the colony, and who could more or less dictate the prices they were willing to pay.

The need for a different marketing arrangement was illustrated rather poignantly by SUDENE's comparison of average farm prices paid at the colony and prices farmers could obtain if their products were sold for them in João Pessoa. The differences are shown in following table.[6]

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[6] Adopted from Plano de Aproveitamento de Camaratuba, SUDENE, p.31.

Product	Average Price per Metric Ton U.S.$ equivalent (1961)		Transport Cost to Joao Pessoa p/Ton U.S.$
	Colony	Joao Pessoa	
Manioc Flour	27	133	10
Beans	116	183	10
Squash	10	133	10
Yams	23	73	10
Water Melons	23	46	10
Corn	40	80	10

SUDENE's plan for the amelioration of the Colony of Camaratuba had as its principal objective.

> "the creation within the colony of an agricultural organization which will foster the development necessary for the eventual emancipation of the project."[7]

SUDENE also hoped to make Camaratuba a pilot project, and to apply the experience to be gained in the development of other colonization projects, that were to be established under the Agency's first five year plan.

The plan for the revitalization of Camaratuba called for a total investment of U.S.$33,500. The local administration of the project was to be completely reorganized, and was to come directly under the supervision of SUDENE. The plan also made provisions for improvements in the physical facilities of the center, the acquisition of farm equipment and

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[7] Ibid. p. 15.

trucks, the distribution of land titles to settlers, the organization of moradores into a collective-type farming arrangement, the opening up of various lines of credit, the sale of farm supplies and the marketing of farm products, and for social and community development.

On March 14, 1962, Celso Furtado of SUDENE and the Governor of the State of Paraíba signed the agreement which was to put the plan into effect. A group of SUDENE technicians began their work in the colony a few days later. While they were well-received in the beginning, after only four months at Camaratuba, they were physically expelled by the settlers and moradores, and at the risk of their lives, were warned never to return again.

What happened is the subject of many conflicting accounts, the fragments of which however, provide a plausible explanation for SUDENE's demise in the project. SUDENE's staff was to cooperate with the previous local administrative employees in effecting a gradual transfer of authority and administration. This was an impossible task. While the local employees had been promised that they would retain their jobs with the state government, either at Camaratuba or elsewhere, they nevertheless, considered their position and authority challenged, and refused to cooperate. Still more serious were the conflicts which developed between the SUDENE technicians and the settlers and moradores. The technicians, almost from the beginning, asserted their authority by telling farmers that they could no longer cut and burn trees on their lots. Since the making of charcoal always brought a small, year 'round cash income for

many families, and since burning was also used to clear new land, this new ruling invoked the intense displeasure of everybody. SUDENE also had made promises of farm credit, seeds and plant material, new farm equipment for the center, and other improvements from which all families were to benefit. Because of funding and administrative difficulties, these promises were slow to materialize. Finally, the technicians had promised to teach farmers to make farinha quebradinha, a special type of manioc flour which enjoys a wide market and brings a high price. Overly ambitious, the technicians gave orders to tear down several of the old manioc mill, to be replaced by new mills with modern and mechanized equipment. As there were long delays in beginning with the construction of the new mills, the farmers finally revolted en masse, and literally chased SUDENE's staff from the colony.

5.2 Conditions in 1970

Very little had changed at Camaratuba from the earlier conditions found by SUDENE.

The size and composition of the local administrative staff had remained the same, although the pessoal para obras had increased from nine to fifteen. Total administrative expenditures for the project in 1969 were equal to U.S.$7,688, while the total revenue from the conga and from the sale of crops produced on the land belonging to the center had increased to U.S.$4,800.

The number of settlers had remained unchanged. However, the number of morador families had increased from 214 in 1961 to 271 in 1970.

The one day work rule or cambão was discontinued a few years ago, but, all farmers continue to pay the ten per cent conga on all manioc flour processed. No tax is levied on other crops or livestock.

While primary education to grade four is mandatory, in 1970, Camaratuba still had only two schools and four teachers, for a total of 819 children between the ages of six and fourteen. As in earlier days, the school continues to operate on a half-day basis. Many children are unable to attend because of distance. Others attend irregularly or drop out at the end of the second or third year.

No efforts are made at community development. The only social services provided are occasional visits to the center of a public health nurse or a doctor and of a dentist.

The cooperative store went bankrupt in 1969 and was closed. In the meantime, one of the more enterprising settlers has opened a small general store in the center, and is providing the function previously provided by the cooperative store.

The roads and buildings in the center are in a state of disrepair. The electric generator broke down three years ago, with the result that the water distribution system of the center has also fallen into disuse. Water is now obtained from several shallow wells.

The only vehicle at the disposal of the administration is a jeep. The tractor, which at one time was available to farmers on a rental basis, is no longer functioning, and the agricultural implements and accessories lie idle and rust.

No technical assistance of any form is available to farmers. Important farm supplies, such as fertilizer, insecticides, and hand tools are not locally available. The marketing of farm products is left entirely in the hands of the people. Some cooperate and hire a truck to take their products to the market at Mamanguape, but the majority continue to sell to middlemen, who also provide some credit to farmers.

Credit arrangements for loans to farmers from official sources, have been and continue to be haphazard. For example, one of the previous directors of the project had arranged for a series of loans from the Bank of Brazil, for the alleged purpose of providing small loans to farmers. An audit by the bank, at a later date, revealed that most of the money had been diverted for the director's personal use. The director was dismissed; however, this action hardly did justice to settlers, who had been deprived of their only source from which they could obtain credit at reasonable rates.

Present credit arrangements are precarious. Since none of the families hold title to the land they occupy, and since only middlemen will accept crops as collateral, only those farmers who have cattle are eligible for bank loans. This requirement excludes nearly all moradores. However, it does include the majority of settlers. In 1969, an estimated eighty-five per cent of all settlers had from one to three beef animals. One exceptional case was the owner of the general store in the center, who had as many as twenty head of cattle. Loans are arranged by an agent from the bank who visits the project. The amounts a settler can borrow

depends on the value of his livestock. The terms normally are six to twelve months, at annual interest rates of eighteen per cent, which is roughly equivalent to the current rate of inflation. While the loan is in effect, a farmer may not buy, sell, or exchange any livestock without permission. Only four of the nine settlers interviewed indicated that they ever made use of bank loans. In 1969, only one of the respondents made use of such a loan. The amount he borrowed was equal to U.S.$88.

5.3 Agricultural Practices, Activities, and Income

From observations made during the author's three visits to the project, in August of 1969, in February of 1970, and again in August of 1970, it was evident that the agricultural practices and activities of the settlers and moradores had remained largely unchanged since the time of SUDENE's survey, nearly ten years ago.

No animals are used to work the land, and no mechanical equipment is available to settlers. The hoe is the exclusive tool for cultivation, while the machete, the axe, and fire serve to clear brush and forest. The practice of burning land which has been fallow, and prior to planting is universal. Five of a total of nine settlers interviewed hire moradores to assist with planting and harvesting operations and the clearing of new land. Remuneration normally is in cash, at a rate of U.S.$0.75 to $0.80 per day. Some settlers also have a morador living on their land, who provides one or two days of work in exchange for the right to cultivate a small subsistence parcel on the settler's own lot.

No commercial chemical or organic fertilizer is available for sale in the project, and none of the farmers interviewed reported the use of such inputs. On the other hand, the use of Formicida, an insecticide to combat ants which are a serious problem, was reported by seven of nine respondents. It is the only farm chemical locally available and used by farmers.

As was noted earlier, the rotation system practiced by settlers is irregular and fairly primitive. However, under present conditions, settlers seem to have few, if any alternatives. On most parcels, only about forty to sixty per cent of the land is arable. A plot of land is normally planted to crops for three to four consecutive years, and then is allowed to lie fallow for one to three years. Most settlers indicated that they try and rotate crops as well, and to have such heavy-feeding crops as manioc and yams followed by beans and corn. However, manioc being one of the principal crops, there appears to be, in many cases, an overlap, with some of the same land being planted to manioc for two consecutive years.

Agricultural activities, by and large, center around the production of the same crops that were being grown in the project at the time of SUDENE's survey, in 1961. Most of the settlers have from 0.5 to 2.0 hectares planted to manioc every year. Yams, beans, and corn are also grown by virtually all settlers, although the areas planted are usually less than 0.5 hectares, and occasionally they miss one year in planting one or the other of the three crops. Crops of much lesser importance

include squash, wetland rice, and cana caiana.[8] Most settlers also have a few fruit trees, which may include several or all of the following: mangoes, oranges, avocados, bananas, jackfruit, and coconut.

The main agricultural season falls into the period between March and August, corresponding to the period of maximum rainfall. However, depending on the types of crops that are grown and upon soil moisture conditions, there are considerable variations with respect to planting and harvesting times. Manioc is normally planted between April and August, with the harvest falling into roughly the same time period after ten to twelve months of growth. Yams are planted in March and April with the harvest commencing in November of the same year. The planting of beans and corn is also done during the rainy season, with harvest commencing after four months of growth. On the lower portion of settlers' land, soil moisture conditions do not permit any work until the onset of the dry season, at which time the soil is drawn into mounds or continuous, elevated rows to facilitate drainage. The crops planted in these areas normally are only beans, corn, and manioc.

The land use and cropping pattern of a typical ten hectare farm of Camaratuba is shown in Figure 4 . The photo was taken during the first week of August of 1970, toward the end of the rainy season.

Of the total area of ten hectares, 3.16 hectares are in forest and capoeira, and 3.54 hectares in unimproved pasture. The area

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[8] A type of sugar cane which is sold to restaurants and bars, for extraction of the juice which is sold across the counter as a type of soft drink.

Typical
Ten

Figure 4

marked "pasture" has not been used for grazing over the past eighteen months, and the only animals on the farm, at the time of the author's visit, in August of 1970, were a few chickens, a goat, and a donkey. Attempts made by the settler, some four years ago, to plant a portion of the floodplain with corn and manioc (cf. row scars lower right hand corner of photo) were not very successful.

On the farm under consideration, the total area suitable for crop production is only 3.3 hectares, of which about twenty per cent is left fallow in any one year. A detailed breakdown of land use is shown in the following table:

Fallow land	0.67 hectares
Vegetable (squash)	0.09
Yams	0.12
Beans	0.22
Beans and Corn to be planted	0.41
Manioc	0.90
Manioc to be planted	0.41
Fruit trees surrounding the house	0.22
Coconut and surrounding capoeira	0.23
Total	3.27 hectares
Area of House and Yard	0.03 hectares

The ratio of cultivated land to fallow land, as indicated above, is approximately four to one. Under a regular rotation system,

this would mean that each field would have to be planted for four consecutive years before it can be put into fallow for only one year. However, as was already noted, the rotation pattern is irregular. The size of fields in different crops varies from year to year, as does the area which is left fallow. The area marked "fallow 1" was retired toward the end of 1969, while "fallow 2" has been idle for two years.

The planting pattern on this property corresponds to that previously outlined. All plots above the road were planted between March 15 and the beginning of June. The manioc plots marked one, two, and three were planted in April, June, and July, respectively. The bean plot in the same area was sown two weeks before the photo was taken. With declining rainfall, from the middle of August onward, the lower portion of the slope will be planted. Half of the area marked off on the photo as "to be planted" will be devoted to manioc, the other half to beans and corn in association.

The estimated total annual labour requirements for this farm would be equal to 298 man/days[9], derived as follows: 149 days for a total of 1.31 hectares of manioc, 54 days for all other annual crops, 10 days for the harvesting of fruit crops, and 125 days for the processing of an estimated 10.4 tons of manioc roots into flour.[10]

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[9] Labour estimates based upon: Jayme de Moura Sena, Tentativa Para Determinação do Custo de Produção de Algumas Culturas de Pernambuco, CONSPLAN, Mimeo. 13 p. Recife: July 1964.

[10] Manioc normally is only marketable when processed into flour. All of this work is done by the settler and his family in one of the project's many manioc mills (casa de farinha).

Assuming that the land use and production pattern of the farm described here covered the period from April of 1969 to March 1970, that the settler obtained yields average for the colony, and that all of his production was marketed in João Pessoa, at average wholesale prices for the period from January to March of 1970, his potential annual gross income, as shown in Table 3, would be equal to U.S.$560.37. Assuming that the settler's 1969/1970 operating expenditures of U.S.$32 for paid labour and U.S.$19 for other inputs also applied to his 1970/71 production and hypothetical sales, his net income would be U.S.$509.37. At a rate of U.S.$0.80 per day for paid labour, he would have had forty man/days of hired work, while the labour contribution of the settler and his family would have been (298 man/days less 40 days) 258 man/days. Returns to family labour would be equal to ($509.37/258) U.S.$1.97 per man/day.

In reality, the income position of this settler for the 1969/1970 production year, during which he planted the same crops and roughly the same areas, was much less favourable. According to the settler's best estimate, his gross income was only U.S.$260. The difference between his actual gross income and his potential incomes is accounted for by the fact that he sells through middlemen, and that an unspecified portion of his production is consumed by the family. If the arbitrary figure of U.S.$100 is allowed for the value of the food produced and consumed by the family, his total value of production at farmgate prices would be U.S.$360. If the above U.S.$51 are deducted for operating and labour costs, his total returns to family labour (including the value of the food consumed by the family) would be equal to U.S.$1.19 per man/day.

APPROXIMATION OF POTENTIAL INCOME POSITION

SETTLER OF CAMARATUBA

Product	Average Area Planted ha.	Average Yields Per ha.	Total Production	Average Product Price $/Kg	Total Value of Production $	Total Labour Required Man/Days
Squash	0.09	5,000Kg	450 Kg	0.06	27.00	7
Yams	0.12	6,000Kg	720 Kg	0.09	64.80	13
Beans	0.63	320Kg	201 Kg	0.15	30.15	34
Corn	0.41	720Kg	295 Kg	0.04	11.80	
Manioc	1.13	8,000Kg	10,480 Kg	-		149
Manioc Flour	-		3,144 Kg*	0.13	367.90	125
Coconut	20 trees	12fr/Tree	240fruit	0.06/fruit	14.40	5
Mango	3 trees	80Kg/Tree	240 Kg	0.11	26.40	4
Avocado	1 tree	28Kg/Tree	28 Kg	0.34	9.52	1
Oranges	5 trees	24Kg/tree	120 Kg	0.07	8.40	2

Potential Annual Gross Income — U.S.$560.37 — 298 man/Days

Actual Gross Income — 260.00

Expenditures for Paid Labour (40 days at $0.80)	32.00	
Expenditures other Farm inputs	19.00	51.00
Net Income		U.S.$209.00
Estimated Value of farm-produced Food		100.00
Total Net Value of Production to Farmer		309.00

Returns to Family Labour (309 : (298-40)) — U.S.$1.19 per man/day

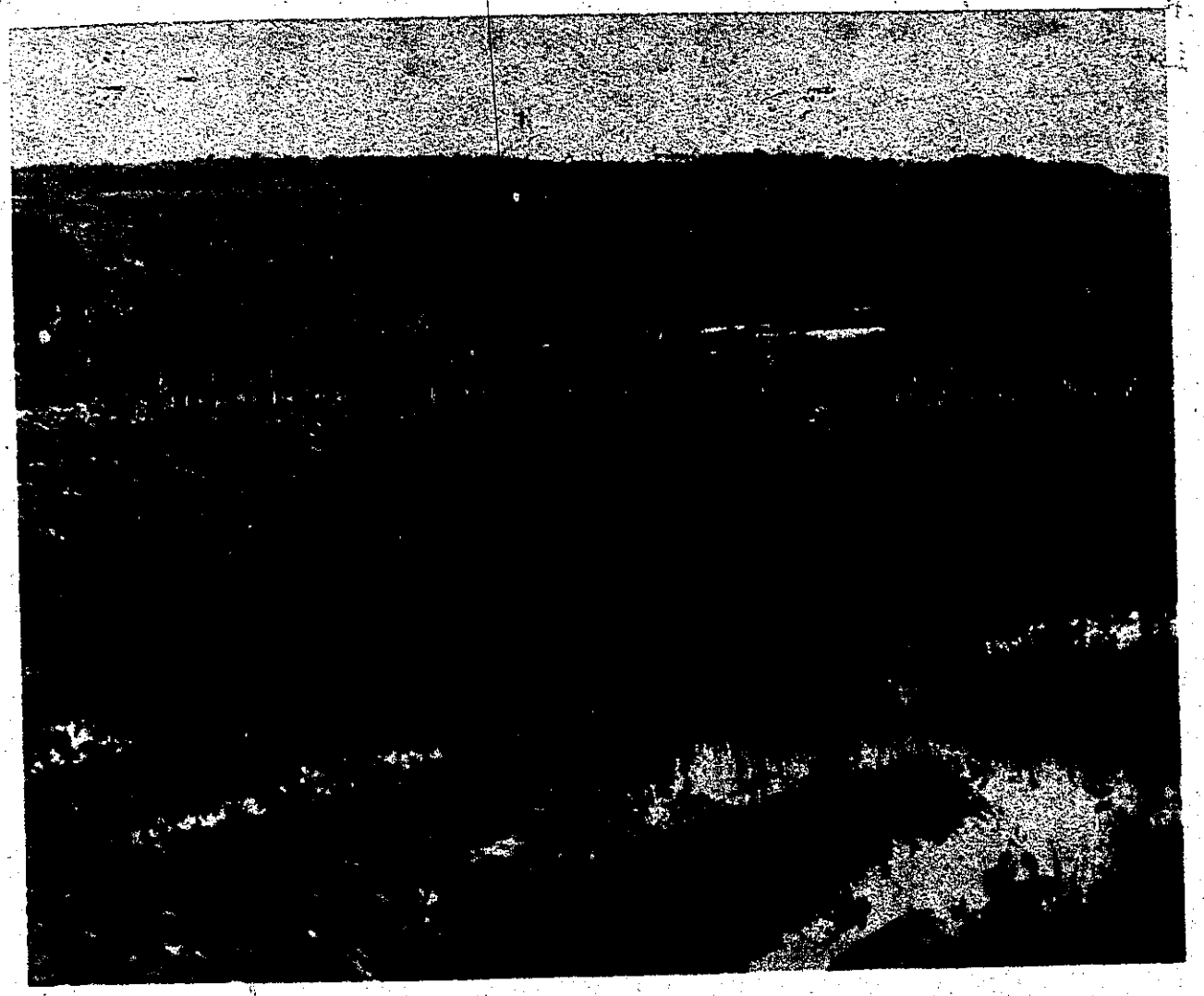
* 314 Kg to be deducted for conga.

The income position of the entire sample groups was found to be variable. Annual gross incomes for 1969/1970 ranged from U.S.$142 to $467, with an average for the sample of U.S.$268. Invariably, variations in income were found to be directly related to settler's area planted to annual crops. Only in one case, was livestock a critical variable in explaining a somewhat higher than average income. The area devoted to crops, in turn, was often related to the settler's age, to the size of the family labour force, and to the extent to which hired labour was employed.

Since the study was primarily concerned with the regular settler, the research questionnaire was not administered to any of the moradores living in the project. However, informal interviews with five morador families suggest that their situation is as precarious as in the past.

The story of João Maria is typical. He is forty years of age and is married. There are five children in the family. The oldest is thirteen, the youngest is one. Four other children have died, one at the time of birth, two before the age of one, and one at the age of five. Neither João nor his wife had any formal education, however, he had learned to sign his name, to count, and to make a few simple calculations.

João was born and raised on a sugar plantation near the Town of Mamanguape. In 1960, he left his work as a cane cutter, and came to Camaratuba in the hope of getting a sítio (a subsistence parcel) of his own, and to make a better life. After working for two years for a settler



Camaratuba

A Morador's Patch of Beans on the Flood Plain Near the Edge of the River

in the colony, he was assigned a three hectare parcel of land on the floodplain of the Rio Pitanga, and was allowed to built his own mud house.

João plants beans, yams, manioc, and a bit of corn. But much of his land is wet, and he can never manage to plant more than one hectare, and most of that after the end of the rainy season. There are also a few banana plants around the house, and two orange trees. He explained, that in a good year he has some manioc flour left to sell, but that most of the time there isn't enough to feed his family. To supplement his meager income, he works three to four months every year on a neighbouring engenho.

He felt that he was better off than many, but was anxious for the cane cutting season to start. At the time of our visit in August of 1970, the family's only diet consisted of manioc flour, bananas, and an occasional fish or crab caught in the river.

5.4 Conclusion

The Colony of Camaratuba was established for the primary purpose of rationalizing the exploitation of forest resources on a large estate which had come into public possession. Labour was to be provided through the cambão system under which each farmer provides one day of service per week to the settlement agency in lieu of paying a rent for his land or house. Improvements in levels of living of the families to be settled was an important secondary objective; however, it must be considered incidental, since the land was not acquired for this specific

purpose. The project also differed from more typical settlement schemes in that no provisions were made for the distribution of land titles and for the eventual emancipation of the project.

While these considerations limit the validity of any criticism of Camaratuba as a planned land settlement, the project could have provided a basis for very significant improvements in the social and economic position of the families that were settled.

The soils of the area, while sandy, of low natural fertility, and excessively drained, would, with the proper use of organic or chemical fertilizer, be well-suited for the production of garden crops, for which there is a wide market in the cities of the region. With all lots bordering on a permanent stream, irrigation on a small scale would facilitate the production of crops during the dry season. This would permit farmers to market some of their production when prices are highest, during the latter part of the dry season and the early part of the rainy season. The introduction of improved land use and agricultural practices would have allowed some of the moradores to be established as official settlers, and for them to achieve incomes comparable to those of the original settlers, by working smaller parcels of land more intensively. Even under present conditions, the establishment of a simple marketing arrangement which would permit farmers to sell at city wholesale prices, would result in significant increases in income for most settlers as well as for some of the moradores.

In reality, conditions within the Colony of Camaratuba are characterized by a notable lack of opportunity for improvements in the

social and economic position of settlers and moradores alike. The colony provides a livelihood for some sixty-four settlers and bare subsistence for its 271 moradores.

The very considerable socio-economic dichotomy between settlers and moradores is perhaps the most glaring example that the colony has failed to meet any of the general agrarian reform objectives, and of bringing about important changes relative to the system and conditions existing outside the project.

Absence of positive change has been the dominant characteristic of the project's past history. Without improvements in opportunities to settlers and moradores alike, lack of progress will also characterize the colony's future.

PROJECT SUMMARY

CAMARATUBA

AGENCY: Department of Agriculture, State of Paraíba
NAME OF PROJECT: Colonia Agrícola de Camaratuba
LOCATION: Municipality of Mamanguape, Paraíba
DATE ESTABLISHED: 1936, State of Paraíba
COST ESTIMATE: No Data
FUNDING: State Government

TYPE OF SETTLEMENT:
Size: 6,510 ha Number of Lots: 64
Layout: dispersed housing Lot Size: 10 hectares
Tenure: Patrimony of State Government, no titles given.

PHYSIOGRAPHY:
Mean Annual Rainfall: 1,534 mm Mean Annual Temp.: 24.6ºC
Wet Season: March to August Dry Season: Sept. to Feb.
Topography: Broad Valleys, Tabuleiro Upland
Soils: Coarse sands, sandy clays, alluvial soils

ECONOMIC DATA:
Principal Crops: Manioc, Yams, Beans, Corn, Coconut, Fruit Crops
Livestock: Cattle
Services: Manioc Processing Facilities
Settler Incomes: Average Annual Gross Income U.S.$268
Range U.S.$142 to $467
Estimated Average Value of Production per hectare of land in crops: U.S.$215 (assuming city wholesale prices)
Estimated Average Returns to Family Labour: U.S.$1.19 per man/day.

SOCIAL DATA:
Average Family Size: 5.7 Average Age of Settler: 53.2
Services: Primary Education, Some Public Health Services
Number of Settlers: 64 Number of Moradores: 271

VI

TWO CRC PROJECTS: CABO AND VITÓRIA

6.1 The Companhia de Revenda e Colonização (CRC)

Growing social unrest in the rural regions of Pernambuco during the latter part of the 1950's, the clamour of the Peasant Leagues under Francisco Julião, and the lack of organization and progress which characterized existing settlement projects in different parts of the state, prompted the government of Pernambuco in December of 1959 to pass Law No. 3506, which created the Companhia de Revenda e Colonização. The function of the company was to promote agricultural development through the purchase, storage, and sale of farm products, the sale of agricultural inputs, and through land redistribution and colonization in different parts of the state.

While the government retained 90 per cent of the company's shares and effective control over the selection of the company's executive, CRC was to function as a semi-autonomous public corporation, accountable only to a special council of the state government. The company was granted tax exemption for a period of ten years beginning in 1960. It was given jurisdiction throughout the state to establish colonies on public land, to acquire new land through purchase or expropriation, to secure investment capital from domestic and foreign sources, and to sign agreements with public and private organizations to further the cause and objectives of the company.

CRC's major assignment was to establish 43 new colonization projects in different parts of the state, and to settle a total of 5,000 families between 1961 and 1965. In addition, CRC was to take over the administration of a number of small colonies, previously under the management of the state's Department of Lands and Colonization, which had passed out of existence.

Settlement Objectives and Policy

The government's objectives for colonization, the procedures and regulations to be followed by CRC, and the implementation plan for the program are set forth in a detailed and carefully elaborated master plan.[1]

The two principal objectives of colonization were to increase agricultural productivity and production and to improve the welfare of the beneficiaries of the program. In addition, the government hoped to achieve the following goals:

a. the establishment (fixation) of selected rural families on land of their own, giving preference to individuals from the drought-affected regions of the interior, without however, excluding the possibility of selecting qualified farmers from other regions or states, or of foreigners in accordance with the norms specified by federal law.

b. the promotion of the family farm, the rational exploitation of resources, and the more equitable distribution of agricultural land.

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[1] Plano Piloto da Política de Colonização do Estado de Pernambuco, CRC, Recife 1962.

c. The improvement of the regional supply of food, with the aim of eliminating supply irregularities and chronic food deficits of the growing urban centers of the state; increased crop and livestock production, larger profits to small farmers, the promotion of agricultural processing industries, and the development of export markets.[2]

The plan envisaged the establishment of two categories of settlements: the "green belt" colony, to be located in proximity of urban centers and concentrating upon the production of important food crops, and the "interior" colony, specializing in industrial crops and livestock production. Some 10,000 hectares of public land in the Zona da Mata and the Agreste were to be turned over to CRC for parcelization. Additional land was to be assembled in areas suitable for colonization. A comprehensive socio-economic and physiographic survey was to precede the acquisition of such additional properties.

The standard colony was to have a dispersed housing arrangement with each family living on its own parcel. However, in areas where ready access to a potable supply of water could not be assured for each family, the aldeamento or nucleated settlement system was to be used. Depending on the location and size of a project, it was to contain an administrative center and several or all of the following buildings and facilities: schools for primary education, a church, a recreation center and play ground, a health and social center, a farm supply store and office of the rural extension

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[2] Ibid. p. 24.

service, a blacksmith shop and facilities for mechanical repairs, a cooperative store, crop processing facilities, warehouses and silos, and a small weather station. The size of individual parcels was to be decided on the basis of local physiographic conditions, with lots of 5 to 10 hectares on land that can be irrigated, 10 to 20 hectares on land partly irrigable, and 30 to 50 hectares on land without irrigation possibilities in the dry interior. No provisions were made to allow adjustments in lot sizes within a project.

As already pointed out, preference in the selection of settlers was to be given to families from the drought-affected regions of the interior. In order to qualify for selection a candidate was to show good intention to live on the land, to work it with his family, and to meet the following "basic" and "indispensable" requirements:

a. to be physically and mentally capable of agricultural work, and to be free from contagious diseases.

b. to have had five consecutive years of agricultural experience as renter, share cropper, or salaried worker.

c. to be over twenty years of age and under fifty.

d. to be free from military obligations.

e. to be landless (i.e. not to hold title to any rural property).

f. not to be an agent or employee of a public or private organization, company, or business.

g. to be free of personal characteristics which might inhibit his adjustment and adaptation as a settler.[3]

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[3] Ibid. p. 28.

Following the candidate's acceptance into the colony and the sucessful completion of a three year probationary period he was to sign an agreement of purchase and was to commence regular annual payments on his property. During the probationary period a settler was to pay an annual rent equal to six per cent of the total value of his lot. After the signing of the agreement, the debt of each settler was to be calculated on the basis of total project costs divided by the number of settlers in the colony. This amount was also to include local administrative expenditures during the first three years of the life of the project.

The master plan also outlines the general regulations governing the conduct of the settler:

> "He must occupy his lot and commence work within sixty days after acceptance. Unless his house is already built, he must complete construction work within six months after arrival; credit and other necessary assistance will be provided. Within the first year he must fence the front portion of his lot and plant a minimum of ten fruit and ornamental trees in accordance with the plans of the agency. He must maintain all drainage and irrigation ditches on his land, and that portion of the road bordering on or traversing his lot. He must treat his neighbors with respect and meet his financial obligations and promises on the dates specified. At all times he must cooperate with the agents of the local administration and the extension service, and to follow their instructions. If his lot is ten hectares or larger, ten per cent of the area must be retained as forest reserve. He must assure that his animals do not stray from his property. Abuse of these regulations and failure to cultivate his land for more than six months shall lead to his eviction."[4]

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[4] Ibid.p. 31.

For each colony, CRC was to establish a land use and production plan, taking into consideration ecological characteristics, land capability, distance to markets and processing centers, product prices, the cost and availability of important farm inputs, and a number of other factors. This plan was to be reviewed annually, and was to be sufficiently flexible to permit adjustments in response to changing conditions.

Settlers were to receive production and consumption credit, technical assistance, agricultural equipment and implements on a rental basis, storage and transportation of their product until a cooperative is organized, lumber and other construction materials at cost, medical and dental assistance, and free primary education for their children. To provide these services, CRC was to work in close collaboration with the National Association of Rural Credit and Assistance (ANCAR), the National Institute of Immigration and Colonization(INIC), the Rural Social Service (SSR), the Federation of Rural Associations of Pernambuco (FAREP), various state government agencies, SUDENE, the Bank of the Northeast and others.

In anticipation of the eventual independence and self-government of each project, every effort was to be made to develop local leadership and to provide orientation and guidance in the establishment and management of farm cooperatives. After the emancipation of a project, the cooperative was to assume all local administrative functions formerly carried out by the settlement agency.

Emancipation of the colony was to take place after settlers had paid off their debts and had received full titles to their properties.

Investment Requirements and Funding

The implementation of the settlement program was to extend over the five year period from 1961 to 1965. The master plan provides a general outline of the implementation phases and gives a breakdown of estimated expenditures by types of investment. Since only a small portion of the more than 50,000 hectares of land required for this program had been acquired, and the exact location of all 43 projects had not been decided upon at the time the master plan was prepared, global investment figures or costs on a project by project basis had not been fully determined. However, separate implementation plans prepared in 1961 for three colonies that were established under this program, provide some indication about project costs and the proposed allocation of funds. The three projects are the CRC colony at Vitória, Cabo, and Guabiraba. Cabo with 3,400 hectares was planned for 340 families, while Vitória and Guabiraba, each with 1,100 hectares, were to accomodate 100 families each.

The total investment required for the three projects, in 1961 was estimated at U.S.$3,348,100 or $6,200 per family.[5]

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[5] Calculated on the basis of Dec.1961 dollar/cruzeiro exchange rate. (U.S.$1.00 = 300 cruzeiros)

This estimate included all fixed capital investments, i.e. the land, construction of roads, buildings, settlers' houses, equipment and machinery, as well as total expenditures for local administration, education, health, and extension services, depreciation and interest, production credit and supplies furnished to settlers for the first three years of the life of the project.

Only 11 per cent of this total represents the cost of land and 5.6 per cent the cost of topographic surveys, land division, the construction of roads and of settlers' houses. Buildings, installations, equipment, vehicles, and machinery belonging to the administrative center account for another 15.9 per cent, while local administrative expenditures and services for three years were estimated at 16.7 per cent. A surprising 50.8 per cent of the total anticipated investment was designated as working capital for settlers for year one, two, and three, and was to assure that by the end of the third year 80 per cent of each lot would be under cultivation with annual and perennial crops as specified in the plan for each of the three projects.

If cost estimates for Vitória, Cabo, and Guabiraba are considered representative, the total capital required for the entire program would have been equal to U.S.$31 million. Since implementation was to extend over a five year period, it was hoped that capital generated by the first projects would provide a significant portion of the financial resources required for the later colonies, thus considerably reducing the initial amount of funds

necessary to make the program viable.

Most of the funds required for infrastructure, machinery, equipment and other material capital were to be met by a U.S. $9.3 million long term loan from the Interamerican Development Bank.[6] The state government was to contribute public lands, bear the cost of education, health, and extension services, and secure the loan funds necessary to advance operating capital to settlers. No other sources of funds are specified in the master plan, although in the implementation of the first three projects, a grant of U.S.$1.0 million of Public Law 480 funds under the Second Wheat Agreement was made available to CRC. At a later stage, considerable contributions were also made by the federal government through the National Institute for Agrarian Development (INDA).

Implementation: Problems and Early Results

Despite the government's carefully elaborated and detailed master plan, the settlement program was ill-fated from the very beginning. As a government-controlled company, CRC was not immune to the political vicissitudes of the time, and prior to 1964, during the most critical years in the life of the company, suffered from frequent changes in its management. Support by different state government agencies which were to contribute important services, was at best sporadic. Only a small portion of the funds required for the implementation of the first three projects was actually released by the government. The situation was further aggravated by serious inflation.

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[6] This loan was not provided. Four projects were established and funded with PL-480 monies, state and federal funds.

All of these difficulties are reflected in the experience of the three CRC colonies at Vitória, Cabo, and Guabiraba.[7]

Individual plans for each of the three settlements were prepared in 1961, and were released at the same time as the master plan. Implementation commenced in the same year, and by the end of 1963 a total of 403 families had been allotted properties at the three sites. By September of 1964, implementation was to have been completed, with the first settlers terminating their probationary period and beginning to make regular payments toward ownership. However, while the subdivision of the land and the selection and placement of settlers was achieved in a remarkably short period of time, many critical aspects of the program had to be omitted or were seriously curtailed.

In an agreement between the Government of Brazil, the State of Pernambuco, the CRC and the United States Agency for International Development, USAID contributed the equivalent of U.S.$1.0 mill. in P.L. 480 grant funds. Funds were disbursed over a 27 months period from June 1962 through September 1964. These inputs were to provide for first year costs covering the construction of houses, community centers, schools, water systems, extension services, equipment, and the purchase of animals. Additional development costs for the second and third year were to be borne by the state.

An audit report prepared by USAID/Brazil in November of 1966 provides some indication of the progress that had been achieved

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[7] A fourth project was established by CRC in 1965, the Colony Cabrobo in the San Francisco Valley.

by that time and of the difficulties encountered by the CRC.[8]

It was found that only 276 of 403 houses programed were constructed. Complementary facilities such as water systems and sanitation facilities had not been built. Very limited progress had been made with the construction of new roads. The only community buildings provided by the state were schools. These were found to be inadequate to accomodate some 1216 school age children; only 438 were able to attend school. Few of the services to train and instruct settlers were provided. Lacking the necessary guidance, colonists planted traditional low profit crops, using traditional farming practices and only half of the land allotted to them. Incomes were so low that they were unable to meet their financial obligations. AID funds did not result in the generation of a revolving fund (as intended) to further develop and expand the colonies. Conditions within each settlement were considered no better than sub-standard conditions observed in the surrounding rural areas.

The report suggests three major reasons for the limited progress evident at that time:

1. poor selection procedures for settlers
2. monetary and price inflation
3. insufficient support by the state government

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8 USAID/Brazil, Report on Examination of Pernambuco Colonization under Project Agreement No. 512-11-120-129 for the Period June 21, 1962 through Sept. 30, 1964, Office of the Controller, USAID/Brazil, Report No. 11/67, November 4, 1966.

Of the original 403 settlers established in the three locations approximately 150 families left permanently during the first two years, and were replaced by applicants from CRC's long waiting list. In a survey conducted by the state, only two out of 21 families were considered satisfactory settlers, as the following table indicates:[9]

Status	No. of Families
Abandoned the land	6
Sent other people to work their land	2
Did not properly utilize funds received	5
Had no background in agriculture	3
Were unable to pay for financing	2
Land unutilized due to sickness	1
Satisfactory	2
Total	21

While no information could be secured about the manner in which the original settlers were selected, the statistics cited above and the high failure rate suggest that the criteria established in the master plan were not rigorously applied.

Inflation had the two-fold effect of depreciating cruzeiro funds that were released but could not immediately be converted into material capital or services, and of driving up construction costs at a rate faster than the actual rate of inflation. Between 1962 and 1964 the construction index for the State of Guanabara increased from 747 to 2560, representing an increase of 242 per cent as com-

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[9] Ibid., p. 6.

pared to a rate of inflation of 200 per cent over the same period of time. AID contributions made in cruzeiro funds over a 27 months period also were subject to drastic devaluation. At the time the agreement was signed in June of 1962, the total allocation of 350 million cruzeiros was equal to U.S.$1.0 million, while by the last contribution date in September of 1964 the dollar equivalent value of the same sum had declined to approximately U.S.$300,000.

Finally, insufficient support by the state government in providing essential services, and more seriously, in failing to secure and to release the funds that had been pledged, further jeopardized the entire program. As of June 1965, CRC recorded the receipt of 456 million cruzeiros as follows:

	Amount Pledged 1962		Amt. Received 1962-65
	Cruzeiros	U.S.$ equiv.	Cruzeiros
USAID/Brazil	350,000,000	1.0 M.	350,000,000
State of Pernambuco	1,310,451,534	3.7 M.	106,264,672
Total	1,660,451,534	4.7 M.	456,264,672

While the 1961 cost estimate for the three projects was equal to U.S.$3.3 million, the total amount pledged by USAID and the State of Pernambuco in June of 1962 was equal to U.S.$4.7 million.[10] However, as is evident from the above table, only 27 per cent of the total amount pledged was actually released. If the inflation factor and cost increases are taken into consideration, it becomes obvious

[10] The amount pledged was higher than the original cost estimate of $3.3 mill. because of adjustments in response to rising costs.

that CRC attempted the near impossible: the establishment of three large land settlement projects on less than one-fifth of the funds required for such an undertaking. For this reason alone, any criticism of CRC's achievements, or lack of it, would probably be difficult to justify. The question one ought to ask obviously is not why these projects have failed to achieve their objective but why they have come into existence at all, how they have survived and actually have managed to show some signs of progress in recent years.

6.2 The CRC Project at Cabo

History and Development

The colony at Cabo is the largest of the three projects established by CRC between 1961 and 1964. The settlement is located in the Municipality of Cabo, some six kilometers west of the market town and small industrial center bearing the same name. (Fig. 5). Conceived as a "greenbelt" project, and located only a twenty minute drive from the City of Recife, the colony was to develop a diversified agriculture, producing important food crops and animal products for local and regional markets. Passion fruit[11] was to be grown as the principal industrial crop.

The 3,326 hectares comprising the present settlement formed part of the sugar estate of the Usina José Rufino, which the State of Pernambuco expropriated in 1960 to make room for the development of the Industrial District of Cabo. Some 2,326 hectares of the remote

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[11] Passiflora edulis, a perennial plant the fruit of which is the basis of a popular fruit juice.

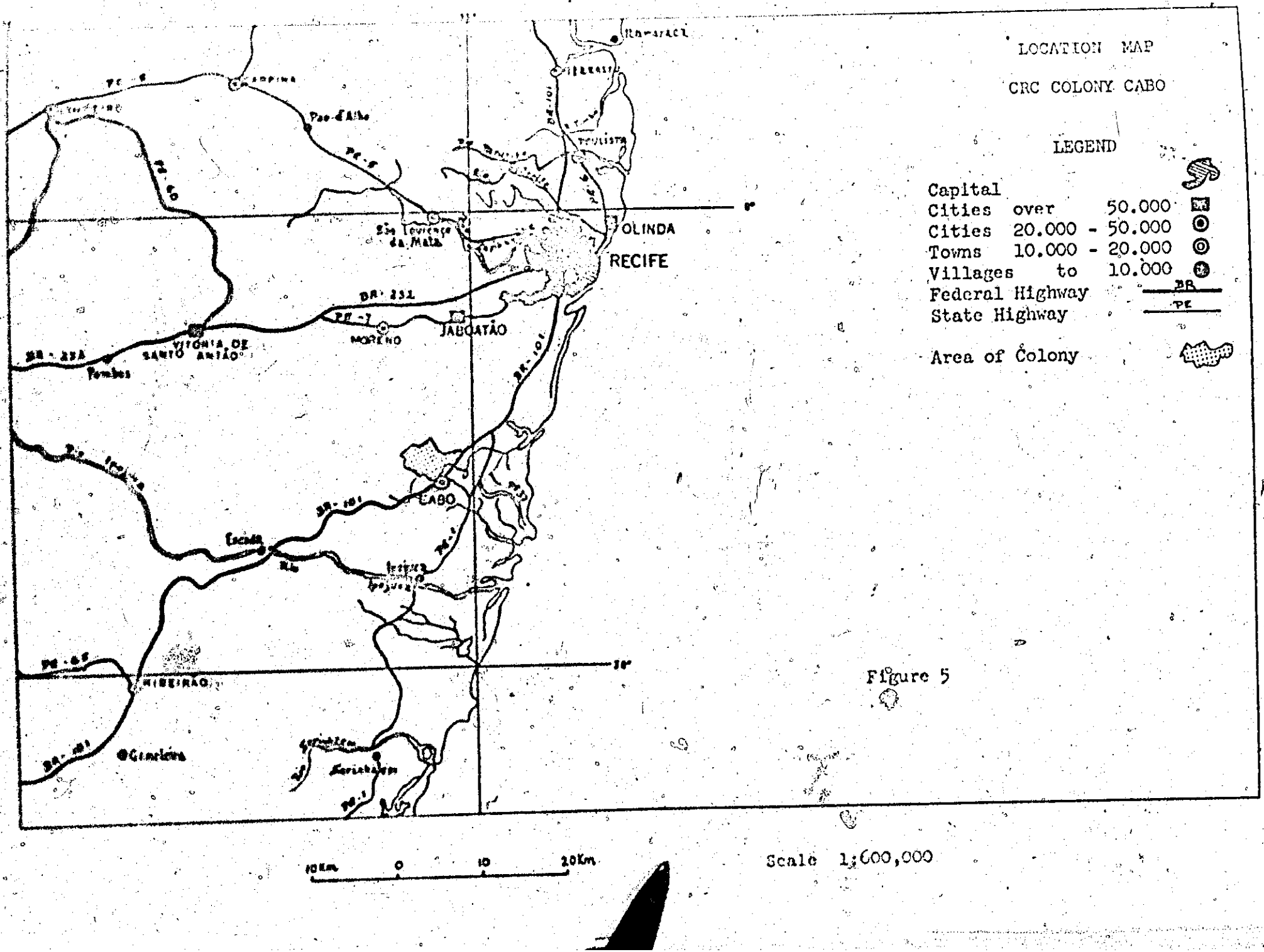
LOCATION MAP
CRC COLONY CABO
LEGEND
Capital
Cities over 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to 10.000
Federal Highway
State Highway
Area of Colony
RECIFE
OLINDA
JABOATÃO
MORENO
CABO
VITÓRIA DE SANTO ANTÃO
Pombos
Escada
RIBEIRÃO
Gameleira
Jaboatão
Moreno
Cabo
Escada
Ribeirão
Gameleira
10Km 0 10 20Km
Scale 1:600,000

Figure 5

and hilly section of the Rufino property were sold to the CRC in 1961 for the sum of U.S.$190,000(equiv.) or approximately $60 per hectare. The following year, an additional 1,000 hectares were acquired, bringing the total project area to 3,326 hectares.

Annual rainfall in the area is 1,670 mm, with a rainfall regime typical for the region. The wet season extends from March until August. Occasional rains characterize the dry season from September through to the middle of February. The maximum elevation in the project is 140 meters above sea level, while maximum local relief within the colony does not exceed 70 meters. Topography is characterized by fairly narrow, but flat-bottom valleys that are enclosed by numerous hills with round, forest covered tops and generally steep, concave slopes.

The soils of the slopes are deeply weathered, eroded clays that have been classified as red-yellow podzols.[12] They are acidic (pH of 5.8 in surface horizon 1-20cm), deficient in basic nutrients, but with proper farming techniques and the use of fertilizer can sustain intensive cultivation. Valley soils tend to be darker, higher in organic content, more fertile, but are often imperfectly or poorly drained; they are well suited for sugar cane. Where aeration and drainage are improved through hilling or other practices, high yields are possible for a variety of other crops such as bananas, yams, and manioc.

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[12] FAO, Soil Survey and its Interpretation in Relation to Agricultural Development in Northeast Brazil, Report No. 2015, Rome: 1965, p. 33.

The distribution of lots, location of roads, schools, and of the administrative center, are shown in Figure 6 . Except for a portion of land along the eastern boundary of the colony, which is to become a water reservoir, the entire area is divided into lots. The majority of the lots are ten hectares in size. However, because of the difficult terrain, and attempts to provide each settler with some valley land, some lots are as much as five hectares larger or smaller. All lots are serviced by roads, and during the dry season are accessible by truck. After prolonged rains access by motorized vehicles becomes difficult, and often impossible.

The administrative center, as originally planned, was to contain nearly all of the facilities specified in the master plan. A second smaller center was to have an extension office, a medical post, a school, and a manioc mill. Because of the agency's financial difficulties, only one center with minimum facilities was established (Fig. 7).

To manage the colony, CRC was to provide a salaried full-time staff of 51 people, including two resident agronomists, a veterinarian, skilled craftsmen, tractor operators, field supervisors, and 20 unskilled workers or operários. ANCAR, the federal extension agency, was to provide three full-time extension workers. The services of nine teachers, two doctors, and two dentists were to be contracted from state government agencies. Again, because of budget constraints, CRC was unable to provide more than one third of the personnel specified in the plan. For similar reasons, supporting agencies fell short in

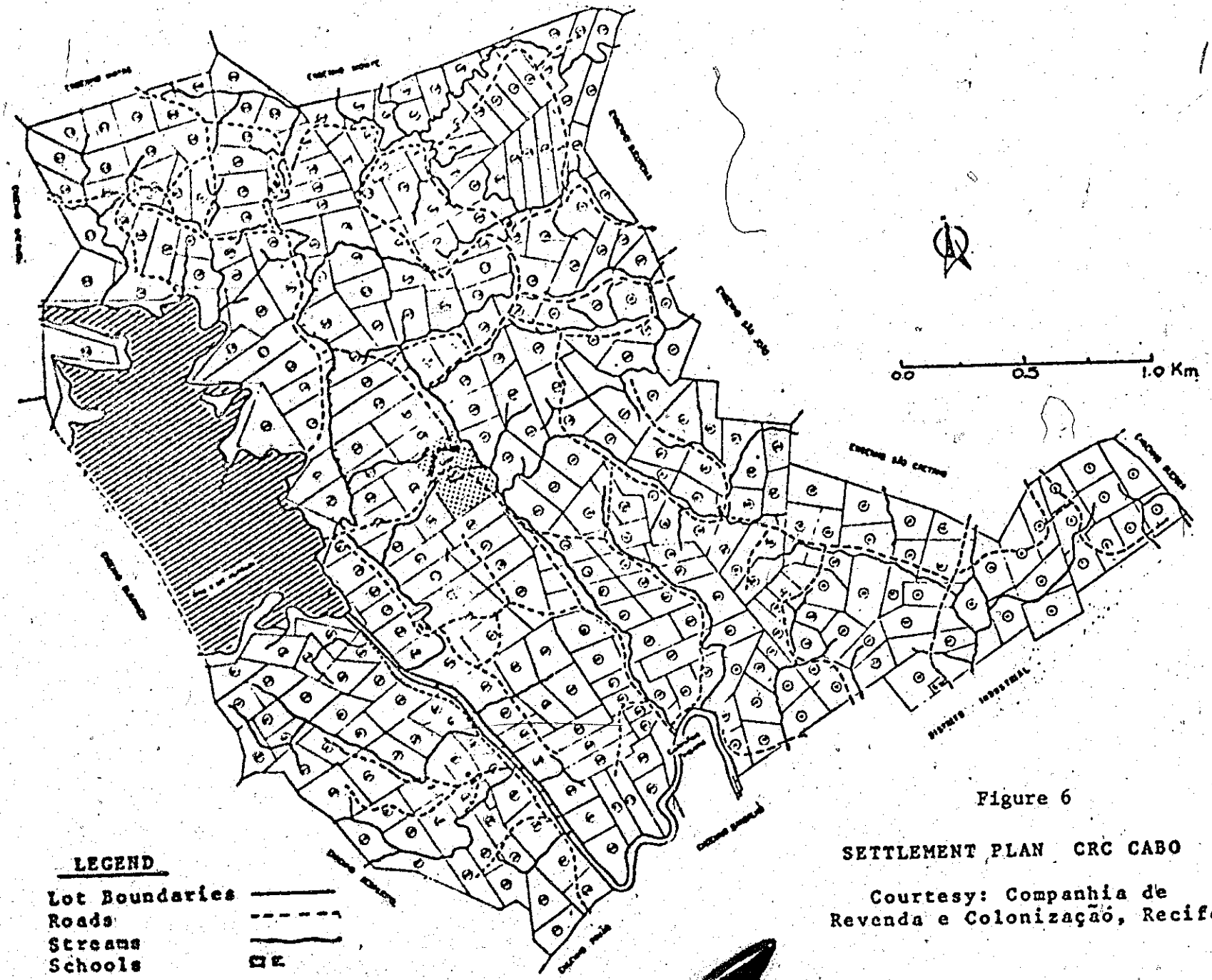

Figure 6

SETTLEMENT PLAN CRC CABO

Courtesy: Companhia de Revenda e Colonização, Recife

Figure 7

Settlement Center CRC Cabo

1. Admin. Office	SC	Sugar Cane
2. Machine Shed	M	Manioc
3. Admin. Residences	B	Bananas
4. Corral for Livestock	R	Settler Residence

——— Boundary of Center

their obligation to provide the services required. CRC assumed the responsibility for primary education, a function which only recently was taken over by the state's department of education, as originally planned. Medical and dental services were sporadic. The project never did have a full-time health staff. Services by the federal extension agency were at first provided irregularly, but were discontinued at a later date.

Over the years, there have been further reductions in the size of the local staff. In the beginning of 1970, the local management consisted of five people: an agricultural technician, a tractor operator, a field supervisor, and two operários. In 1969, total salary expenditures for CRC personnel at Cabo were equal to U.S.$3,250, representing little over 10 per cent of the annual salary budget specified in the plan of 1961.

A 1967 inventory lists two trucks, a jeep, and four tractors with implements. However, at the time of our survey, there were no vehicles at the colony. The administrator was making his rounds on horseback, and only one tractor with implements was in working condition.

The establishment of a local cooperative, one of the most important aspects of the original plan, never materialized. Because of the adverse experience and publicity of the nearby Cooperative of Tiriri[13], settlers are extremely wary, and do not wish to have a cooperative organization imposed upon them from above.

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[13] Discussed in Chapter VII.

On the other hand, mistrust among the settlers of Cabo and lack of organizational ability and guidance have prevented the spontaneous development of such an organization from below.

As pointed out earlier, little information could be secured about the manner in which the original settlers were selected. From survey data it is evident that the selection criteria employed at Cabo were less rigorous than those outlined in the master plan. Of a sample of 32 settlers, 87 per cent came from the coastal region, the remainder from the Agreste. As many as 9 settlers or 31 per cent did not have prior agricultural experience as renters, sharecroppers, or rural workers, while four settlers indicated that they actually held title to farm land prior to settlement.

Placement of settlers commenced in mid-1962 and was completed by the end of the following year. Yet, at the time of the survey, in the early part of 1970, 17 of the families or over 50 per cent of the sample had been in the colony four years or less. This corroborates the observation made in the previous section of a high failure rate in the beginning, and tends to point to inadequacies in selection procedures as well as dissatisfaction among those who left.[14]

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[14] It is not known how many settlers were evicted and how many left of their own volition. According to agency officials, the latter group was by far the larger.

Despite serious budget curtailments during implementation, CRC constructed most of the houses for settlers, and provided some equipment, animals, plant material, and production and consumption credit to the original group of settlers. Of 32 respondents, 15 moved into a finished house upon arrival, 16 indicated that they helped in the construction of their house, while only one claimed to have built his house without any form of assistance from CRC. The houses are brick structures with a stuccoed exterior and tile roofs. The interior has plaster finished walls and cement floors. There are two to three bedrooms, a living room, and a kitchen. Sanitary facilities are in a lean-to outside the house. Water is obtained from shallow wells located a short distance from the house and normally at slightly higher elevation to reduce the possibility of contamination.

Since the area was previously a sugar plantation, the larger proportion of the land received by each settler was free of forest. Where necessary, the agency assisted with difficult land preparation.

After arrival, each settler was to receive a cultivator for animal traction, a back sprayer for insecticides, a motorized water pump, 50 meters of garden hose, three calves, one donkey, three brood sows, and 200 chicken. During the first year, each family was also to receive U.S.$380 (equivalent) in production credit, as well as some consumption credit where necessary. It could not be determined what quantities of credit were actually made available to settlers; however, some credit arrangements have existed since

the very beginning and 30 of the 32 respondents indicated that they have received one or several loans since their arrival. Also virtually all of the original settlers did receive the equipment and animals specified in the plan.

Some of the settlers interviewed complained that "some families received everything while others received nothing". These apparent inconsistencies on the part of the agency in the items provided to different families relate to the fact that equipment and animals formed part of the original "package" that went with each lot. These provisions were made only once. Thus, a late comer to the project might be assigned a parcel whose previous tenant had cannibalized or sold the equipment assigned to him, and who had butchered the animals he had received. While the regulations state that the settler leaving the colony is accountable for everything he has received, in practice, this ruling was never very effective in dealing with an irresponsible individual. The result was that settlers who came as replacements, were penalized for the abuses of those who left.

The plan for the settlement [15] envisaged that by the end of the first year after placement, each settler would have 4.5 hectares of land under cultivation, to be increased to 8.5 hectares

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15 CRC, Projeto de Colonização No. 2, Recife, 1961.

by the end of the third year, as follows:

Type of Crop	First Year Ha.	Third Year Ha.
Vegetable	0.5	0.5
Manioc	1.0	2.0
Passion Fruit	1.0	3.0
Subsistence Crops	0.5	0.5
Tree Fruit	0.5	0.5
Bananas	0.5	1.5
Improved Pasture	0.5	0.5
Total	4.5	8.5

The operating capital required for each farm for the first three years was estimated at U.S.$1,200 (equiv.). The gross income target for each farm for the first production year was set at U.S.$1,500.

While settlers were unable to provide specific information about their income situation for the first three years after their arrival, they were able to recall how much land they planted to crops each year, and the types of crops they were growing. From this information it is evident that CRC's land use and income targets were not achieved.

Only one of 32 settlers planted 5 hectares in his first

year, exceeding the agency's target, eight settlers planted from 2.1 to 4 hectares, and 22 planted from zero to 2.0 hectares of land. The mean for the sample was 2.0 hectares. The area planted by settlers during their second and third year declined slightly to a mean of 1.7 and 1.6 hectares respectively.[16]

The experience of settlers in other colonies was found to be very similar, and showed that not only will the average family find it difficult to cultivate more than a total of five hectares, but also that the average family cannot manage to plant more than two new hectares to annual or perennial crops in any given year. If land preparation involves the breaking of capocira (brush), the area a settler can plant is even less. Thus, if settlers planted only perennial crops, their total area under cultivation could increase by two hectares every year until the maximum area is reached which a family can manage. However, the need to plant manioc and other food crops imposes limitations upon their time and ability to plant perennial crops. For this reason, the total area under cultivation increases only gradually over a period of several years. In the case of Cabo, therefore, the assumption that each settler would bring 4.5 hectares of land under cultivation by the end of his first year in the project, was overly optimistic.

Efforts to introduce the crops specified in the plan also fell short of success. Settlers planted manioc, yams, bananas, and other crops with which they were familiar. The growing of passion fruit and of vegetables never became important.

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[16] Except for year one, these figures do not represent settler's total area under cultivation, but the area newly planted in any given year.

It is ironic, although hardly surprising, that over the years, sugar cane, a crop which was not to be grown by settlers, has become the dominant crop and has probably assured the survival of the project.

Settlement Costs and Determination of Lot Prices

In December of 1967, CRC determined its total investment in the project, established prices for each farm unit, and granted agreements of purchase and provisional titles to settlers.

As of December 31, 1967, CRC records show the following total investments in, and source of funds for the Cabo project:[17]

Source	Amount U.S.$equiv.[18]	Percentage
CRC	118,843	34
USAID/Brazil (PL 480)	46,252	13
INDA (Loan Fund)	181,420	53
Total	U.S.$346,513	(NCr$1,074,200)[19]

[17] CRC, Statement dated December 31, 1967.

[18] Based upon the December 1967 exchange rate (U.S.$1.00 equal to NCr.$3.10)

[19] According to CRC, these figures represent total invest-

With 322 settlers in the project, the average cost per unit and liability per family was calculated at U.S.$1,076.

To achieve an equitable assessment of each lot, CRC devised a point system, as follows:

Factor	Number of Points						Maximum Points
	0	0.5	1.0	1.5	2.0	3.0	
Area ha	0-6.9		7-9.9		10-12.9	over 13	3
Topography	very poor	poor	fair	good	very good		2
Fertility	very poor	poor	fair	good	very good		2
Forest Area	none	some	adeq.				1
Water	none	some	adeq.				1
Access	poor	fair	good				1
Total							10

On the basis of the total number of points obtained for each property, lot prices were set as follows:

Number of Points	Lot Price (U.S.$)
0 to 2.9	774
3 to 4.9	967
5 to 6.9	1,193
7 to 10.0	1,451

19 contd.

ments in the project, from the acquisition of the land until the end of 1967. It is clear however, that they do not reflect true dollar costs. CRC shows a contribution by USAID of NCr$143,382, which in December of 1967 was equivalent to U.S.$46,252. However, since the actual contributions were made between June 1962 and September 1964, representing a total of 143,382,000 old Cruzeiros, or 40.9% of the original 350 mill. Cruzeiros pledged for all three projects, the U.S. contribution alone, if calculated on the basis of the exchange rate of July 1963 (the mid-point of contribution period) would be equal to U.S.$231,000, or nearly five times the value indicated by CRC records. Considering earlier investments by CRC, and contributions by INDA between 1965 and 1967, it is estimated that the actual dollar cost of the project lies somewhere between U.S.$75 and 1.1 million. The global investment estimate of 1961 for Cabo, including expenditures for the first three years was equal to U.S.$1.8 million.

To the base price for each lot was added the value of the house, the assessment of which ranged from U.S.$32 to $96, and the value of animals and equipment received by each family.

In January of 1968, settlers were granted provisional titles, and signed promissory notes to make ten annual payments to liquidate their debts. While the 1967 assessment is not subject to monetary correction or interest charges, settlers were given the option of paying off their property in less than ten years. Payments were to commence at the end of 1968. By December of the following year, 85 per cent of settlers in the sample had completed their second payment.

Conditions in 1970

As pointed out already, CRC maintains only a very small staff at the colony. Its function is to collect payments from settlers, to review applications for credit, to arrange for the marketing of sugar cane, to provide a tractor with implements and an operator, and to maintain order. The agency hopes to relinquish its control of the project in the near future, and to turn it over to the Pernambuco Secretariat of Agriculture.

Sugar cane, which accounts for slightly over 70 per cent of settler's gross revenue, is marketed through contracts with two local sugar mills. The cane is picked up in the field by the mills. Settlers are paid standard prices, which vary, however, with the grade and quality of cane. Payments are made to CRC which in turn pays the settler.

This arrangement gives the agency some indication of levels of production, it provides a basis for deciding how much credit a settler can afford, and it facilitates the collection of payments from farmers.

While this marketing system has functioned reasonably well, it is not without problems. Settlers complained that they have to wait for weeks after selling their cane crop before receiving payments. Because of inefficiencies in the collection of the cut cane, cane will often lie in the field for several days, resulting in a decline in saccharose content, a lower grade, and a reduced price. Heavy rains in July and August of 1970 caused land slides in one part of the colony, blocking off the road. Settlers in the affected area were concerned that the road would not be cleared in time for harvest.

The marketing of all other products of the colony, bananas, manioc flour, yams, different fruit, chicken, eggs, charcoal, etc. is left to the individual farmer. Some settlers cooperate in renting a truck to take their goods to the nearby town market of Cabo, others walk to town, using donkeys to carry their goods, and some sell to middle men.

Credit is arranged by CRC through loan funds from the Bank of Brazil and the Pernambuco Development Bank (BANDEPE). Terms normally are 6 to 12 months on annual interest rates of 16 to 20 per cent. Credit is not always available at the time and in the amounts required, and no guidance is provided in the use of credit.

In 1969, 65.6 per cent of the settlers in the sample made use of bank loans, ranging in amounts from U.S.$50 to $1,000, with an average of $250 per settler. A statistically significant relationship was found between the amount of credit used by settlers, the area of land under cultivation, the amount of paid labour used, and gross incomes.[20]

To assist settlers in the cultivation of their land, a tractor with implements and operator is made available by CRC. Rental normally is charged on an hourly basis, at a rate (in 1969) of U.S.$4.50 per hour. Only four of the 32 respondents made use of this service in 1969. Explanations by settlers why they do not use this service more fully included the following comments: "it costs the same to hire a tractor for one hour as a labourer for a week", "the tractor operator doesn't know what he is doing and leaves the land in a very unfinished condition", "the land is too steep", and "the tractor is never available when needed". It is interesting to note however, that the four settlers who used the tractor in 1969, all had from 6 to 20 hours of tractor time, and all had over five hectares of land under cultivation.

No health services are provided at the colony, although, settlers make contributions to a health insurance plan, and medical, dental, and hospital facilities are available at Cabo.

There are five public schools operating within the project

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[20] r values obtained are credit/land 0.632, credit/labour 0.823, credit/gross income 0.765. r values are significant at the 95 and 99% level when the value of r exceeds 0.349 and 0.449 respectively.

for an estimated 580 children between the ages of 7 and 14. Primary education is the responsibility of the state, which provides six teachers for the colony. No data could be obtained about enrolment or attendance.

No other services are available in the colony. There are no meetings or organized activities, and no technical orientation of any kind is made available to colonos.

Despite the very serious curtailments that were necessary in the implementation of the colony, and the very limited services available to settlers, there is evidence that many families have experienced improvements in their material position, educational opportunities, access to and availability of health services, and housing conditions, if compared with their position prior to settlement. While the average 1969 annual gross income of the sample group was only U.S.$674, with only 6.2 per cent attaining gross incomes in excess of the suggested minimum of $1,500, fifty-five per cent of the group indicated that they now find it easier to feed and clothe their family than prior to settlement. Improvements in educational opportunities, health services, and housing conditions were reported by 68, 48, and 72 per cent respectively.

To the outside observer, these improvements may be barely discernable, to the previously landless agricultural worker and his family they are, in most cases, very real. This fact was illustrated rather poignantly in one of the author's informal interviews with one of the settlers at Cabo. The purpose of my question in this particular instance was to satisfy my curiosity about the validity of the common assertion that

peasants living in abject poverty are inured to suffering, barely conscious of their miserable state, and hence devoid of aspirations for a better life.

The question directed at my respondent was phrased in careful circumlocution and with no intention of offense, yet the reaction it evoked left no doubt that its hidden purpose was understood, and seemingly was taken as a personal affront. The old man, who had been seated on a crude bench in his sparsely furnished living room, and who, until then had quietly responded to my previous questions, jumped to his feet, bent forward, and his eyes intently fixed on mine, began to articulate his emotions: "How do you suppose I felt when I came home at times, with eight hungry children staring at me, and asking 'painho, did you bring something to eat' and with tears in my eyes, I had to tell them 'no, go to bed, perhaps tomorrow'. Do you suppose I felt different from any other honest man in a similar situation ? And when I had to bury three of my small children, one after another in less than two year's time, did I feel different than any other father ? But the Lord gives and he takes away, and he helps us bear our sorrow. No, all of us want a better life. God has been good to us. The government has given us this house and land, and that's more than we ever had before." The man was referring to his earlier life as a cane worker on one of the nearby engenhos, and was comparing his previous existence with his present situation as a settler.

Agricultural Practices, Activities, and Income

Agricultural practices of settlers have remained traditional, in the sense that little use is made of modern inputs or of improved farming techniques.

No evidence was found of innovativeness and experimentation with new crops or varieties. All of the 32 settlers interviewed indicated that they plant the same crops year after year. Nearly all of the settlers practice burning prior to planting. Only 12.5 per cent use chemical fertilizer, while 43.7 use insecticides (mostly ant poisons). None of the 32 respondents use animals to cultivate their land, and the cultivators found on most properties go unused. A few of the motor pumps that were given to the original group of settlers, can still be found. They are not being used for irrigation as intended. The few gasoline engines still in working order have been put to use to drive small manioc rasping machines, which previously were hand operated. Thus, innovativeness, albeit of a different kind than expected by the agency, is not lacking.

To argue that settlers are obstinate in adopting better ways would be a hasty conclusion. Time and again, their response to probing questions about their methods, revealed that their ways are rational if seen in the light of the conditions under which they operate. They are not ignorant of the fact that fertilizer, insecticides, better varieties and better farming techniques will increase yields and incomes. Their explanation requires no comment "Não temos condições nem orientação", - we cannot afford these things nor do we have anyone to show us.

Agricultural activities center around the production of sugar cane, bananas and manioc.

Sugar cane was found to be the most important crop in terms of area planted and gross income for 90.6 per cent of settlers. Bananas and manioc are the only other important crops, and were reported by 87 and 78 per cent respectively. Only one settler in the sample did not plant any sugar cane, two did not plant any bananas, and five did not report any manioc.

The average area per farm devoted to sugar cane, bananas, and manioc was 3.4, 0.8 and 0.7 hectares respectively. Crops of minor importance included oranges, avocado, jaca, and coconuts. The average area in crops in 1969 for the 32 respondents was 5.4 hectares, with a minimum of 1.8 hectares and a maximum of 10. The average area in cultivated land, including any fallow land and improved pasture was found to be 6.0 hectares.

In a survey conducted by USAID in 1967, of the Colony of Cabo,[21] the average area of cultivated land per family in a 25 per cent sample, was found to be only 4.1 hectares. Thus, even though the project has been in existence for nearly ten years, the area of cultivated land on many properties is still in a process of upward adjustment. The more recent arrival of families who came to replace those who left tends to support this conclusion and provides a partial explanation. Furthermore, the author believes that the distribution of provisional titles

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21 Lee Hines, Pernambuco Colonization, Report on Survey Findings USAID/USAID, Recife, Jan.18,1968, Mimeograph, 4 pages.

Sugar Cane, Manioc, and Bananas

The Principal Crops of the Cabo Colony

Cabo

Preparation of the "Matumbo", a circular or oblong Mound for the Planting of Manioc on poorly drained Ground. This Boy can prepare five or six of these Mounds in a Day.

in January of 1968, acted as an important incentive for additional effort on the part of settlers who had been in the project for several years, and who, until then had no guarantee that they would be given an opportunity to become owners.

While most of the settlers of Cabo have some animals, only a few derive any income from the sale of animals and animal products. Sales were reported by nine settlers and ranged from U.S.$14 to $110, with an average of U.S.$38 (U.S.$14 for the entire sample). Most of that income was derived from the sale of eggs and poultry, and in two instances from the sale of calves.

None of the settlers interviewed had any pigs, six had one or two goats, nineteen had from two to twenty chicken, ten had one or two head of cattle, and all but four settlers had one or two donkeys or horses.

In Table 4 , an income approximation is presented for what could be a typical farm of Cabo. Using average land use values of the sample group, and assuming typical yields for the area and average product prices for the 1969/70 harvest season, a potential annual gross income of U.S.$1,116 is indicated. If total expenditures for this hypothetical farm were also to correspond to the averages for the sample, and would be composed of a cost of U.S.$86 for paid labour and U.S.$154 for other farm inputs, estimated returns to family labour would be U.S.$1.62 per man/day.

The actual average annual gross income for the sample group from the sale of crops was only U.S.$660. An additional U.S.$14 per family,

TABLE

APPROXIMATION OF POTENTIAL INCOME POSITION

SETTLER OF CABO

Product	Average Area Planted ha	Average Yields per Hectare	Total Production	Average Product Price U.S.$	Total Value Production U.S.$	Total Labour Required Man/Days
Sugar Cane	3.4	38 tons	129 tons	4.90/ton	632	412
Bananas	0.8	24,000 fruit	19,000 fruit	0.50/100fr.	95	48
Manioc Roots	0.7	9,500 kg	6,650 kg			80
Manioc Flour			1,995 kg	0.14/kg	279	79
Misc. Fruit	0.5				80	30
Total	5.4 ha				$ 1,116	649 M/D

Potential Annual Gross Income: U.S.$ 1,116

*Average Expenditures for Paid Labour: (107 days x $0.80) (Sample Data) U.S.$ 86

*Average Expenditures for Other Inputs: 154

*Average Expenditures Total: 240 240

U.S.$ 876

Average Net Income:

Total Family Labour (649 M/D less 107 M/D): 542 Man/Days

Estimated Average Returns to Family Labour: 876/542 U.S.$ 1.62 p.Man/Day

Average Annual Gross Income of Sample: U.S.$ 674 Minimum: U.S.$ 67 Maximum: U.S.$ 3,889

Proportion of Settlers in Sample with Annual Gross Income less than U.S.$1,500: 93.8 per cent

*Based upon sample data

from the sale of animal and animal products brings the total to U.S.$674. The difference between the potential gross income and the actual average, can be accounted for by the product consumed by the family, by generally slightly lower than average market prices received by settlers, and by the wide range of values comprising the average.

The range in annual gross incomes of the sample group for 1969/70 was from U.S.$67 to U.S.$3,889, although only two settlers, representing 6.1 per cent of the sample had gross incomes above the suggested minimum of U.S.$1,500. As many as ten settlers, representing 31.3 per cent of the sample had incomes of less than U.S.$300, fifteen settlers or 46.9 per cent had incomes in the range of U.S.$300 to $900, and five settlers representing 15.7 per cent had incomes in the range of U.S.$1,200 to $1,500.

The settler with the largest income in the sample (U.S.$3,890) had ten of his fourteen hectares of land planted to sugar cane. He plants no other crops. He claimed to have one of the most fertile pieces of land in the project. A good portion of his land is nearly level. This enables him to make regular use of the tractor provided by the agency. His labour expenditures for 1969/70 were U.S.$490. His expenditures for fertilizer, fungicides, tractor rental, and other inputs were U.S.$1,215. His net return was an estimated U.S.$1,195. His returns to his own labour were difficult to estimate, because virtually all of the manual work on his little plantation, as he explained it, is being

done by his hired workers.[22]

In this particular case, average yields for sugar cane ranged from 68 tons per hectare on slopes, to as much as 85 tons on bottom land. Since planting and weeding operations require roughly the same amount of time, whether yields per hectare are 30 tons or 75 tons, greater productivity invariably results in larger net returns. Higher yields also result in economies in harvesting operations, because a worker can cut and bundle more cane per day in a heavy crop than in a light crop. Finally, productivity is related to the use of fertilizer. However, given current prices of fertilizer, recommended rates of application, and current cane prices, the application of fertilizer cannot be justified, unless the land, in its natural state, will yield at least 45 to 50 tons of cane per hectare. Thus, the settler with fertile valley land, as in the case under consideration, is at a decided advantage, while the settler with steep slopes, obtaining yields of cane of only 25 to 30 tons per ha, would be spending nearly double the entire value of his crop on fertilizer, if he were to follow recommended practices.[23]

On the other extreme of the income scale, are settlers who plant only two or three hectares of cane, or who obtain very low yields.

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[22] This kind of settler is the exception. It was interesting to note that he had adopted many of the mannerisms of the typical landlord. He moved his family to town, he employs workers for whom he has become some sort of patrão, he shuns manual work, and he complained that his workers are lazy and that cane prices are bad.

[23] Cf. Table A 21 (Appendix) "Economic Implications of Various Sugar Cane Practices".

The area planted to sugar cane and other crops was found to be related to such factors as the length of time a settler has been in the colony, to his age, his health, and the size of the family and the family labour force.

Low yields invariably could be traced to land capability and the planting of sugar cane on steep and very poor land. The majority of these poor settlers also follow the practice of planting their best land to manioc and other subsistence crops instead of to sugar cane, which would yield higher economic returns. This may be partly ascribed to lack of orientation. However, even were orientation has been provided, the practice continues. To the agronomist, such examples often are evidence of the ignorance and obstinacy of the peasant. The peasant's own logic seems more convincing: he can live on manioc but not on sugar cane.

Conclusion

The CRC project at Cabo is one of the few colonies in Northeast Brazil which was to benefit from a carefully elaborated implementation and development plan. If assessed against this plan the project at Cabo would need to be regarded as a failure. Since financial difficulties did not permit the project to be developed in accordance with the details of the plan, a comparison between objectives and achievement is hardly meaningful and justifiable.

CRC's experience at Cabo and the actual course of development of the project, gives rise to speculations and certain conclusions as

to where the project would stand today, had it been implemented as planned. The author feels that larger investments would not have resulted in very appreciable differences in the income position of most settlers, and that present results could have been achieved with a fraction of the investment that was actually made.

The agency's plan to promote the establishment of small mixed-farming enterprises, for the production of vegetable, a variety of fruit crops, as well as cattle, pigs, and chicken, was very laudable but overly optimistic. The training requirements in converting cane cutters into small mixed-farming entrepreneurs were greatly underestimated. Still more serious was the misjudgment of the family's labour capacity and the apparent disregard of limitations imposed by topography.

By the end of the third year, each settler was to have 8.5 hectares of land under cultivation, of which eight hectares were to be in annual and perennial crops. Since all of the labour was to be provided by the family, even half of this amount of land planted to one or several of the crops specified, would have taxed the labour resources of a family, with two adults working, beyond capacity. The intensive cultivation of only one half hectare of vegetables could occupy two adults and several children on a year 'round basis. The cultivation of two hectares of manioc and the processing of the roots would require 480 man/days. Three hectares of passion fruit would require a minimum of 400 man/days of labour. It was assumed that the use of animals, and of tractors to be provided by the agency, would

enable settlers to cultivate larger areas of land. For this purpose most of the 320 settlers in the project were provided with a cultivator. Yet, according to local officials, not one of them is using animal traction for cultivation, and very few make use of the tractor. Lack of orientation, and settlers' inability to afford draft animals are two possible explanations. More significant is the experience of several settlers who have tried to use animals, but who returned to the hoe because they found it to be the only effective way to work their steep fields.

Settlers at Cabo are growing the crops with which they are most familiar and which they can sell. They adhere to farming practices which they know. They can be encouraged to experiment where experimentation promises to be profitable. These observations strongly suggest that investments at Cabo could have been limited to the essentials of land, roads, credit, and markets, to achieve results comparable to those previously described.

PROJECT SUMMARY

CRC CABO

AGENCY: Companhia de Revenda e Colonização, Recife
NAME OF PROJECT: Núcleo Colonial do Cabo
LOCATION: Municipality of Cabo, 30 km South of Recife
DATE ESTABLISHED: 1961
COST ESTIMATE: U.S.$1.8 million (equivalent) 1961
ACTUAL INVESTMENT: No Data (estim. between U.S.$.7 and 1.1 mill.)
FUNDING: State Government, USAID, INDA

TYPE OF SETTLEMENT:
Size: 3,326 hectares — Number of Lots: 322
Layout: houses dispersed — Average Lot Size: 10 hectares
Tenure: Three year probationary period after acceptance, full title granted after completion of payment.

PHYSIOGRAPHY:
Mean Annual Rainfall: 1,670mm — Mean Annual Temperature: 23ºC
Wet Season: March to August — Dry Season: September to February
Topography: Undulating to hilly, max. local relief 70 meters
Soils: Red Yellow Podzols, unclassified valley soils

ECONOMIC DATA:
Principal Crops: Sugar Cane, Bananas, Manioc
Livestock: Poorly developed, some cattle, goats, poultry
Services: Marketing of sugar cane, some bank credit, availability of mech. equipment on rental basis.
Settler Incomes: Average Annual Gross Income U.S.$674
Range U.S.$67 to $3,889
Estimated Average Value of Production per ha. of land in crops: U.S.$205
Estimated Average Returns to Family Labour: U.S.$1.62 per Man/Day

SOCIAL DATA:
Average Family Size: 8.4 — Average Age of Settler: 47.4
Services: Primary Education to Grade 4; Health Insurance Plan
Number of Families: 322

6.3 The CRC Project of Vitória

History and Development

In January of 1960, the Government of Pernambuco expropriated the Engenho Galiléia in the município of Vitória de Santo Antão. The engenho, comprising some 497 hectares of rolling, steep and rocky land of low fertility, was occupied by 140 moradores. Most of the moradores were members of the local Peasant League, which was agitating to take possession of Galiléia and of other engenhos in the area.

The land was turned over to the CRC and was subdivided into 10 hectare parcels. Because the area would accomodate only 47 of the 140 moradores, CRC, in September of the same year, acquired two additional engenhos: Barra and Terra Preta, adjoining properties with a combined size of 603 hectares.

When CRC attempted the implementation of its plan for Galiléia, and offered each of the families to be relocated a ten hectare plot, a house, technical, financial, and social assistance, the incredible happened: the moradores would not accept the offer and refused to move. In June of 1961, after repeated efforts to induce the people to move, CRC made one final attempt. An announcement was published in the Diário Oficial of Recife and in the local paper of the district. Again the moradores failed to respond. The matter was turned over to the court of the state. As a result, CRC was free to proceed with its colonization plan for Barra and Terra Preta, and to ignore the recalcitrant moradores of Galiléia in the selection of settlers.

The project is located some 47 kilometers west of Recife and just north of the town of Vitória and federal highway BR 232 (Fig. 8). Physiographically, the colony is made up of two distinct areas: Terra Preta and Barra. Terra Preta contains the center, is located close to town, and comprises some 179 hectares of undulating land with dark, and fertile clay loams that are considered first class soils for sugar cane as well as other crops. Maximum local relief for any one lot is 45 meters over a distance of 450 meters, or a gradient of 10 per cent. In contrast, Barra, comprising 424 hectares, is located on the "far end" of the colony. Soils for the most part are heavy, reddish and stony clays, that are shallow and interspersed with frequent rock outcrops. Maximum local relief for this area is 100 meters, with as much as 85 meters on any one lot, over a distance of 200 meters or a gradient of 42.5 per cent. One third of the area of Barra is in slopes of 40 per cent or greater.

Annual rainfall for the area is 838 mm concentrated in the months of March to August. The driest months are October and November with 20 and 22 mm of precipitation. While rainfall at Vitória is less than in areas closer to the coast, it is for the most part sufficient to grow similar types of crops. The area is not affected by droughts. The annual mean temperature is 24.2° C.

Implementation of the project began in mid 1961 and was slightly ahead of the program at Cabo. The basic plan for the colony, that is, the size of lots, procedures for the selection of settlers, the provision of housing, animals, production credit, and social services,

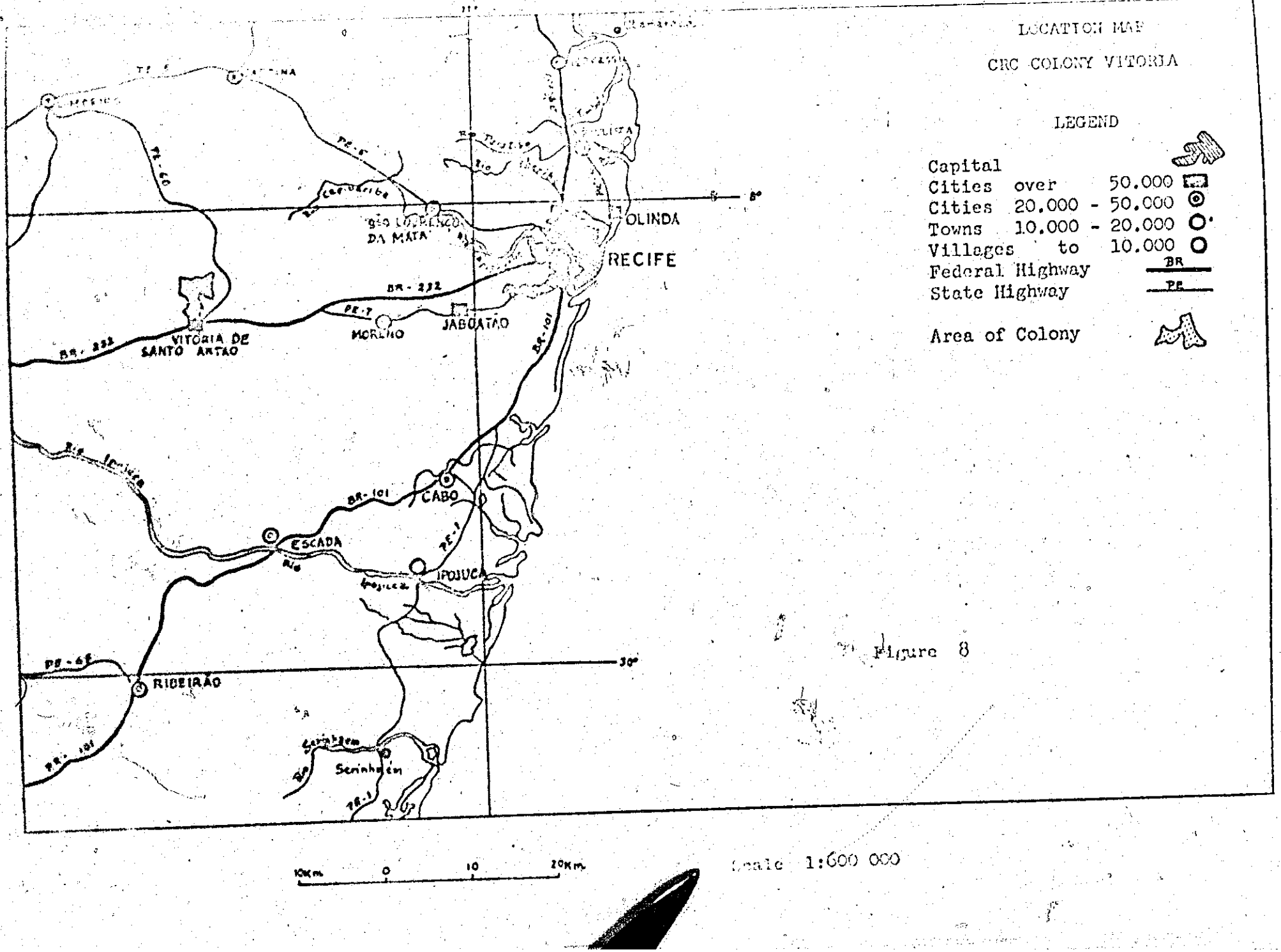
LOCATION MAP
CRC COLONY VITORIA
LEGEND
Capital
Cities over 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to 10.000
Federal Highway BR
State Highway PE
Area of Colony
RECIFE
OLINDA
JABOATÃO
MORENO
VITORIA DE SANTO ANTÃO
CABO
ESCADA
IPOJUCA
RIBEIRÃO
Serinhaém
BR-232
BR-101
PE-60
PE-1
PE-2
PE-7
PE-65
PE-101
35°
30°
10Km 0 10 20Km
Scale 1:600 000

Figure 8

and overall objectives, was identical to the plan for the Cabo project.[24] The implementation and execution of the program however, suffered from the same budget curtailments and from failure on the part of other government agencies to provide the services promised. Despite these difficulties, CRC's experience at Vitória was characterized by fewer difficulties than at Cabo. There has been gradual progress, and settlers appear to enjoy a somewhat higher level of living, and seem to be more satisfied than those at Cabo.

The distribution of the 53 lots of the project, and topographic characteristics are shown in Figure 9 . There are 52 official settlers. One lot adjacent to the center, is used for experimental purposes.

No attempt was made to adjust the size of individual lots to compensate for differences in land capability and topography. The standard parcel is ten hectares, with variations between the smallest and largest lot of about 1.5 hectares. All lots are serviced by roads; they are in better conditions than those at Cabo. An all-weather gravel road passes through the colony and bears a moderate amount of transit traffic between Vitória and a neighboring municipality.

The settlement center, shown in Figure 10 , is within less than 15 minutes' walking distance of the town of Vitória.

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[24] CRC, Projeto de Colonização No. 1, Recife, 1961

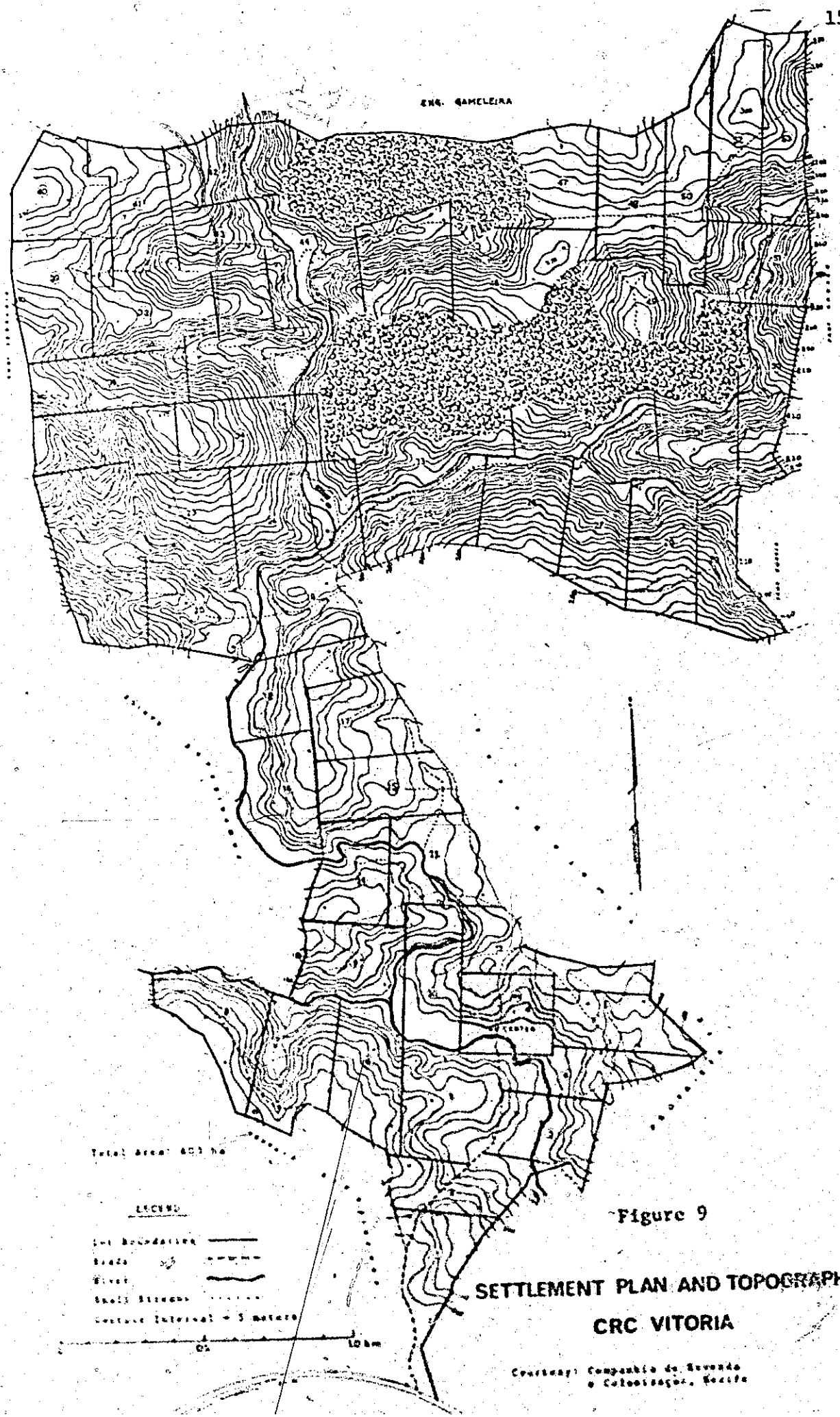


Figure 9

SETTLEMENT PLAN AND TOPOGRAPHY

CRC VITORIA

Courtesy: Companhia de Revenda e Colonização, Recife

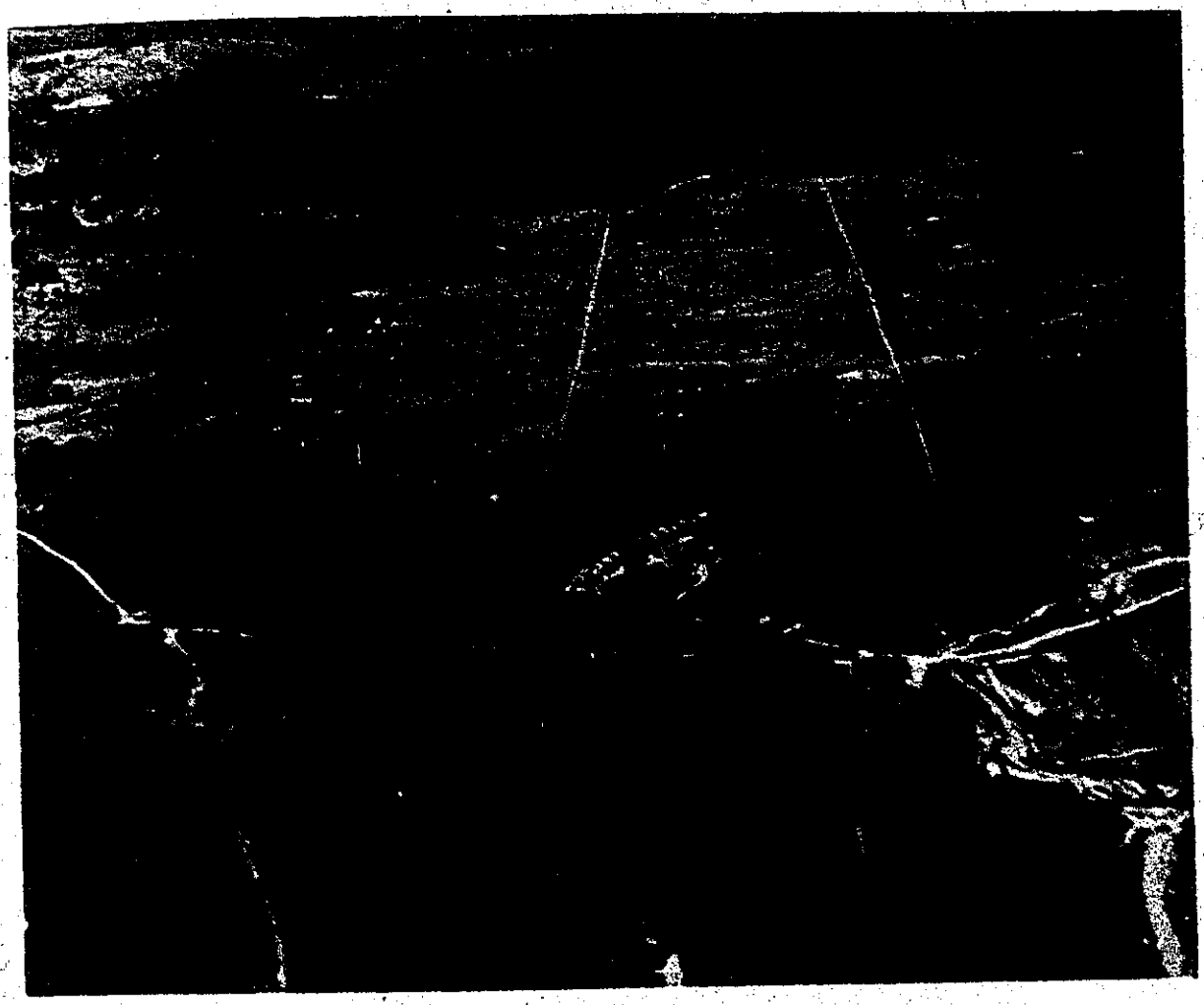


Figure 10

Settlement Center CRC Vitória

1. Cooperative Building
2. Admin. Residences
3. Abattoir
4. Garage
5. Meeting Hall
6. Soccer Field
7. Experimental Lot

SC Sugar Cane
B Bananas
M Manioc
R Settler Residence
—— Boundary of Center

It contains several facilities not found at Cabo, including a meeting hall, a settlers' cooperative, a poultry dressing plant, and a soccer field.

The cooperative was established in 1963, and has played an increasingly important role in the economic life and development of the colony. Its activities are supervised by an agricultural technician of CRC, but settlers elect their own council and president. The cooperative sells animal feed, insecticides, hand tools, and a few other items needed by settlers. In cooperation with CRC staff, it arranges for the marketing of sugar cane, the collection of receipts from the sugar mill, and the payment of settlers. In more recent time, the cooperative has also been instrumental in the promotion of broiler production and marketing. Whenever quantity warrants, it will arrange for the marketing of other products of its members. It also keeps informed on market trends and passes the information on to settlers.

While hardly any of the farmers in the project have had previous experience with cooperatives, over eighty per cent are members. Those interviewed felt that the cooperative was providing a very important service.

Selection procedures for prospective settlers were to conform to the standards set forth in CRC's master plan. Since preference was also to be given to families already living on the two engenhos, this ideal was not attained. However, this may well have been an important

advantage. According to our CRC informant, the failure rate at Vitória was much lower than at Cabo. The majority of settlers had a background in agriculture. One fifth of the families had been living in the area at the time CRC began its program. Most of the remaining settlers came from neighbouring engenhos and had a background as plantation workers. A few came from the Agreste and Sertão.

All houses were built by CRC, and were more or less ready for occupation at the time placement began. Houses are of similar type and construction as in the other project. Settlers received animals, and the equipment specified in the plan. However, CRC was unable to provide more than a small portion of the production credit each family was to receive during the first three years.

The production plan for the individual farm was identical with that outlined for Cabo. Efforts to follow the plan appear to have been more successful than at Cabo. Farmers attempted to grow a variety of crops, including vegetables. However, a few years ago the agency decided that sugar cane would be the most profitable and least troublesome crop, particularly in the Terra Preta section, and began to actively encourage and promote its production. Sugar cane is now the dominant crop of settlers at Terra Preta, while at Barra, bananas, manioc, different root crops, and in some cases vegetables are more important.

Vitória also differs from Cabo in its greater emphasis upon animal production. Two of the six settlers in the sample had 700

and 900 broilers each, all but one had two or three head of cattle, three settlers had goats, none had sheep or pigs.

Settlement Costs and Lot Prices

The original estimate of global investment needs for the Vitória project (not including Galiléia, which was part of the original plan) in 1961 was equal to U.S.$487,000. This was to include the acquisition of the land (which was bought in 1960 for $113 per hectare), local administrative expenditures for three years (including wages for a full-time staff of 32 people), the establishment of all infrastructure, the acquisition of machinery and equipment, and advances of operating capital to settlers for the first three years.

Actual total expenditures of CRC until December of 1966, and the funding of the project are summarized as follows:

Source	Amount[25] U.S.$ equival.	Percentage
CRC	29,964	35.4
USAID/Brazil (PL 480)	19,656	23.2
INDA	34,989	41.4
Total[26]	$ 84,610 (NCr$ 186,144)	

[25] December 1966 exchange rate (U.S.$1.00 = NCr$2.20)

[26] Previous comments (footnote 15) re. true dollar costs apply here as well.

On the basis of this total, the average cost per unit was eatablished at the equivalent in 1966 of U.S.$1,596.

Prices settlers were to pay were determined using a point system similar to that previously outlined, except that only three lot prices were established as follows: U.S.$1,275, $1,590, and $1,818. The first payments were due at the end of 1967. According to agency officials, most settlers have been meeting their commitments.

It will be noted that the average per unit cost at Vitória was higher by some $500 than for Cabo. While this might suggest some economies of scale in the implementation of the much larger colony at Cabo, the writer feels that such economies have not been achieved. The land acquisition cost for Cabo was $60 per hectare as compared to $113 for Vitória. This alone would account for a difference of $530 on a 10 hectare lot. Furthermore, while all major investments in both projects had been completed by the end of 1964, progress at Cabo had been much slower, with the result that lot prices were not established until the end of 1967, a year after the same procedure was carried out for Vitória. Over the intervening 12 months, the rate of inflation was in excess of 25 per cent. Since the inflation factor did not enter into any of the project cost calculations, the apparent per unit cost for Vitória would inevitably be higher.

Conditions in 1970

While CRC's local management at Vitória consists of only two people, an agricultural technician and a field supervisor, services provided to settlers are somewhat better than at Cabo. The agency's agronomist, stationed in Recife, makes weekly visits to the colony. Some demonstration plots are maintained for sugar cane, vegetable, and a number of other crops. A home economist from the state extension service has been providing some part-time assistance to families. A truck and tractor are available to settlers for a nominal charge, covering the cost of gasoline and maintenance. While CRC does not have the staff to provide direct technical assistance in the field, contacts and communication between people are greatly facilitate by the cooperative. The building of the cooperative is located in the centro and close to the road. People on their way to town or returning from the market will often pause here to buy a few things, to pick up money, or to hear the latest gossip and to exchange a few ideas. Also, at least once a month, a meeting is held at the center, which is open to all settlers and provides an opportunity to discuss problems and to ask questions.

As already pointed out, marketing arrangements for sugar cane are made through the cooperative. The use of this channel, however, is not obligatory, and some settlers sell directly to the sugar mill. The cooperative will also market poultry, and occasionally other products when quantity warrants it. The proximity of the Town of

Vitória also gives settlers an opportunity to sell at the weekly town market.

Credit arrangements for settlers are similar to those at Cabo. Credit is available in small quantities. No guidance is provided in the application of credit. The amount a settler can borrow is not based upon his needs or his potential level of production, but upon the amount he is certain to be able to pay back within a specified time. Neither the bank nor the agency will assume any risks. Four of the six settlers in the sample made use of credit in 1969. Amounts borrowed ranged from U.S.$35 to $90.

The colony has one school and two teachers. The school functions both mornings and afternoons, and, judging from settlers' accounts, the educational system at Vitória also appears to be better than at Cabo. There are no visits by doctors or dentists as anticipated in the project plan; however, good health facilities and services are available in the nearby town.

All of the settlers interviewed indicated that they find it easier now to feed and clothe their family, that educational facilities are better, and that they live in better houses than prior to settlement. Five of the six settlers indicated that health services and assistance are easier to obtain than before.

Agricultural Practices, Activities and Income

As in the case of Cabo, agricultural practices have changed very little. The hoe continues to be the principal tool. Animals are not used to work the land, although four of the six settlers (a much higher

proportion than at Cabo) in 1969 made use of the tractor available to them. Insecticides are used by nearly all settlers, but none of those interviewed make use of chemical fertilizer. According to the local administrator, only a few of the settlers, concentrating on the production of sugar cane, make regular use of chemical fertilizer, and purchase it pre-mixed and in bulk quantities from the local sugar mill. Crop rotation is not practiced on a systematic basis, and the burning of the land prior to planting is still common. It was surprising to find that several of the settlers in the Barra section were growing small patches of vegetables along the various stream courses, and are irrigating with the equipment (pump and garden hose) they received at the time of settlement.

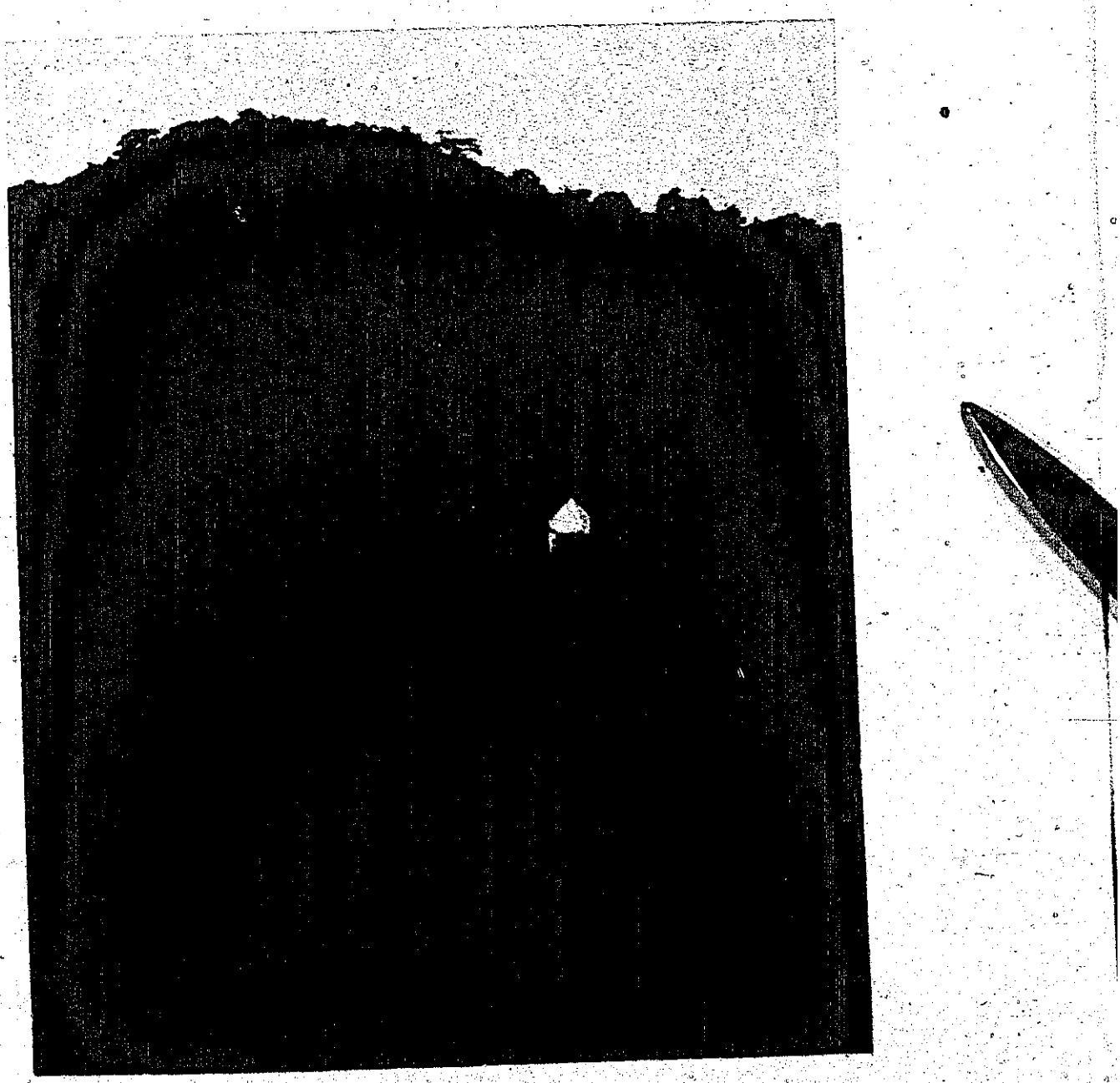
Annual gross incomes in 1969 for the six settlers in the sample ranged from U.S.$17 to $2,088 with a mean of $630. Because of very considerable physiographic differences between the Barra and Terra Preta sections of the colony, differences in enterprise types, and the small size of the sample, an approximation of the income situation of the typical settler in the project is difficult. There are indications, however, that settlers' returns to land, labour, and capital are higher than at Cabo.

The average net income of settlers at Cabo was $434 or 64 per cent of a gross income of $674, while at Vitória, the average net income was $486 representing 77 per cent of a gross income of $630. Returns to family labour were estimated at U.S.$1.32 for settlers in Barra section of the colony, and at U.S.$ 1.85 per man/day for settlers

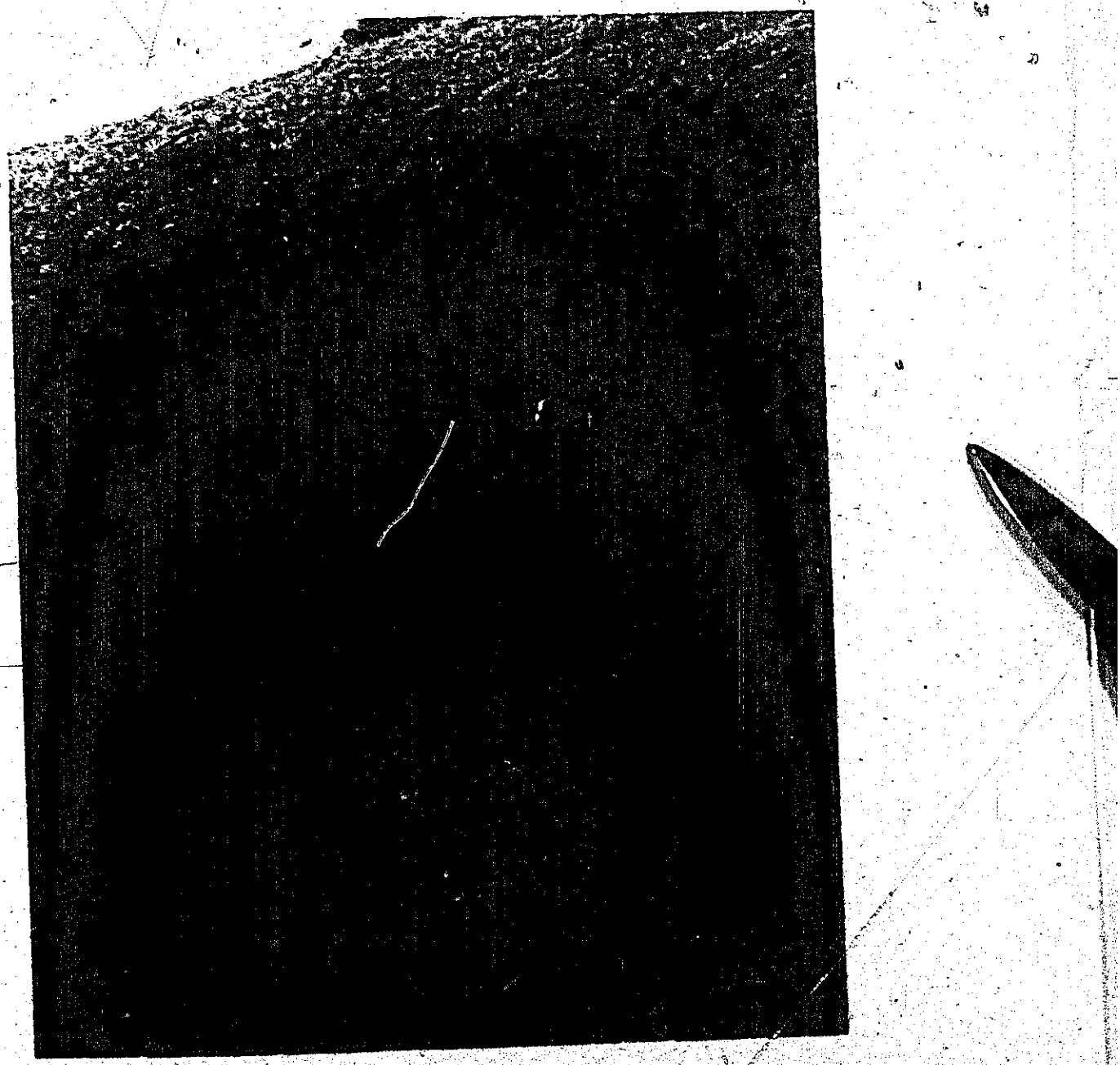
growing sugar cane on the more productive land of Terra Preta.

According to CRC's agronomist responsible for the two colonies, the actual difference in net incomes between farmers of Cabo and Vitória is even greater. While CRC did not provide any data to substantiate this claim, there are a number of reasons which suggest that it is not unfounded. First, settlers in the Terra Preta section obtain average yields of sugar cane of 55 to 60 tons per hectare, and they tend to use their land very intensively (Lot Number 11 shown in the photograph in Figure 10 is a good example). Topography in this area is also amenable to mechanization with the result of lower labour costs for those settlers using the agency's tractor. Most settlers in this area have between five and ten hectares of land in cultivation. Settlers in the Barra section rarely are able to cultivate more than three hectares, of which usually two-thirdsis in manioc, with the rest planted to other root crops, bananas, and in some cases, vegetables. Since they work less land, their labour expenditures are lower, and most of the work is done by the family. In addition, most of the settlers at Barra have two or three head of cattle, some raise poultry on purchased feed, and those who have valley land often grow small patches of vegetables.

Secondly, since settlers are able to sell their produce directly at the market or through the cooperative, profits generally are larger. Also, it places them into a better bargaining position with middlemen who visit the colony. Finally, the average age of settlers at Vitória is lower, the family labour force is larger, and, according to the local



Topography and Soil Conditions limiting
the Choice of Crops at Terra Barra



Excessively steep Slope in the Terra Barra Section of Vitória planted to Manioc

administrator, none of the settlers work for other settlers other than on an exchange basis.[27]

Conclusion

No evidence was found that the Vitória project was favoured in any way during implementation, or of a significant difference in the background of the people of the two colonies. However, the information presented here suggests that greater progress was achieved at Vitória.

While CRC officials tend to attribute the difference in the performance of the two projects to differences in the attitudes of the people, and partly to the agency's own efforts, the real reasons may be more complex. Unless attitude is considered an inborn trait, there are no convincing reasons why initially the attitude of the people selected for Vitória should have been any different than the attitude of the group at Cabo.

The author feels that both projects began with virtually identical human and material resources, but that in the face of the adversities confronting the new settlers, isolation took a particularly heavy toll

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[27] The average age for settlers at Cabo was 47 with a standard deviation of 9.5, as compared to an average of 40 for Vitória with a standard deviation of 8.8. The average family labour force for Cabo was 2.0 adults as compared to 2.9 for Vitória.

among the early group at Cabo.

While the project at Cabo is only six kilometers from the Town of Cabo, it is a cul-de-sac, its remoteness accentuated by topography, its poor access road and difficulties in internal movement.

Traditionally accustomed to some form of community life and the presence of neighbours, friends, and fellow workers, accustomed to taking orders, and dependent upon his patrão, the new settler at Cabo found himself thrust into a strange and in many ways artificial environment. His new neighbours were strangers. He was to live by a new set of rules which meant little to him other than perhaps the knowledge that he could be evicted if he does not follow them. There were promises of help and great expectations on his part; few of these materialized. Above all, he had come to the end of a long and arduous road, faced with a new and uncertain beginning. He was given a plot of land. On it he was to eke out a new existence, to produce, and to learn making many unfamiliar decisions. He accepted what was offered to him, he considered it his due. At the same time, he soon learned that there was no rapprochement and effort to bridge the immense gulf between himself and an impersonal agency. The help he had expected and taken for granted was given sparingly or not at all. Once again, as so many times before in his life he felt betrayed. Added to this, his isolation from friends and the life with which he was familiar, he felt alone, disillusioned and utterly confounded.

Some settlers found it possible to adjust to their new surroundings and situation but many did not, and preferred to leave the colony to give up one uncertainty for another, less unfamiliar.

Settlers at Vitória were also faced with trying circumstances, however, they did not experience the same sense of isolation. The Town of Vitória with its stores, its lively market, and its many activities was within easy distance. The road leading through the colony always brought traffic and people passing through. Although assistance was given sparingly, settlers were able to sell their products at the local feira. Many of the families came from the local area, and some lived and worked on Barra or Terra Preta before the engenhos were expropriated. There was less uprooting and breaking of important ties and relationships. Because the colony is only one sixth the size of the project at Cabo, contacts between CRC staff and the people were probably more frequent and perhaps also more personal.

Considering all of these factors, it is suggested that the families at Vitória developed a different attitude than did those settled at Cabo. At Vitória they seem to have had more reasons to stay and were more willing to make a real effort at self-betterment.

This willingness on the part of the settler to establish firm roots is without doubt one of the most fundamental pre-requisites to the success of a colony, it is the basis for any subsequent development. While this point may be too obvious to dwell upon, it would appear that one of the key problems of the CRC project at Cabo was, initially at least, a lack of sufficient incentive and of favourable

conditions to evoke such a commitment on the part of the new settler. Thus, subsequent progress in the development of the project was retarded not only because settlers left, but also because many stayed on and were unhappy and uncommitted, waiting perhaps for better opportunities that never came.

The CRC expected their candidates for settlement to come prepared with this attitude and willingness to find new roots. However, such commitment on the part of the settler can only develop after his placement, and will depend in large measure on how he perceives his new environment and upon the conditions he finds. If he feels hopeless, isolated, and without help, the result will be uncertainty, failure to make an effort beyond survival, and, in all likelihood, a search for alternatives and escape. On the other hand, if his new situation, as he sees it, is better than what he had left behind, and offers some prospects for a better life, he is far more likely to make this vital commitment expected of him, and to develop attitudes that are conducive to his own progress and the progress of the colony.

In summary, it is proposed here, that in the face of severe hardship, limited economic opportunities, and absence of consistent and dependable help and guidance from one source or another, the degree of physical and social isolation of settlers will have an important bearing upon the nature of their commitment and upon the development of attitudes of individuals as well as the group. The author believes that this factor explains in part the higher failure

rate of settlers at the Cabo project, and some of the difference in the rate of progress of the two colonies.

PROJECT SUMMARY

CRC VITÓRIA

AGENCY: Companhia de Revenda e Colonização, Recife
NAME OF PROJECT: Núcleo Colonial do Vitória
LOCATION: Vitória de Santo Antão, 47km West of Recife
DATE ESTABLISHED: 1961
COST ESTIMATE: U.S.$487,000 (equivalent) in 1961
ACTUAL INVESTMENT: No Data (estim. U.S.$180,000 to $210,000)
FUNDING: State of Pernambuco, USAID, INDA

TYPE OF SETTLEMENT:
Size: 603 hectares Number of Lots: 53
Layout: houses dispersed Average Lot Size: 10 hectares
Tenure: Three year probationary period - contract - full title after completion of payment, over ten year period.

PHYSIOGRAPHY:
Mean Annual Rainfall 838mm Mean Annual Temperature: 24.2C°
Wet Season: March to August Dry Season: September to February
Topography: 179 ha level to gently undulating land, 424 ha steep to very steep slopes and narrow valleys
Soils: dark clay loams, red-yellow clays

ECONOMIC DATA:
Principal Crops: Sugar Cane, Bananas, Manioc
Livestock: Cattle and Poultry
Services: Well established Cooperative which provides marketing function and sells important farm inputs; Agency provides limited amounts of credit, tractor and truck on a rental basis; some group orientation
Settler Incomes: Average Annual Gross Income U.S.$630
Range: U.S.$171 to $2,088
Estimated Average Value of Production per ha. of land in crops:
Terra Preta:U.S.$238 Barra: U.S.$116
Estimated Average Returns to Family Labour: Terra Preta U.S.$1.85
Barra U.S.$1.32 per Man/Day

SOCIAL DATA:
Average Family Size: 8.6 Average Age of Settler: 40.6
Services: Primary Education to Grade 4, Health Insurance Plan
Number of Families: 52

VII

THE COLONY AND COOPERATIVE OF TIRIRI

7.1 History and Development

The establishment of colonization projects in different parts of the Northeast was one of the early preoccupations of SUDENE, the Superintendency for the Development of the Northeast. As previously pointed out, the Colony of Camaratuba was to serve as pilot project in anticipation of future land settlement activities under SUDENE's first five year plan (1961-1965). While the program for Camaratuba was carefully planned but ill-fated, growing social unrest and the potentially revolutionary situation which existed on many of the sugar plantations of the Northeast prior to 1964, led to SUDENE's second, but equally ill-starred experiment in land settlement in the coastal region.

In November of 1960, SUDENE made a large loan to the Northeast Railway Company (Rêde Ferroviária Federal S/A) for the construction of a bridge over the Rio Parnaíba. The loan was due 12 months later and, because the Railway could not meet its commitment, SUDENE agreed to accept as partial payment a 147 hectare tract of land known as Tiriri.[1]

Tiriri is located approximately 8 kilometers south of the town of Cabo and 3 kilometers east of State Highway Pe-1 (Fig. 11).

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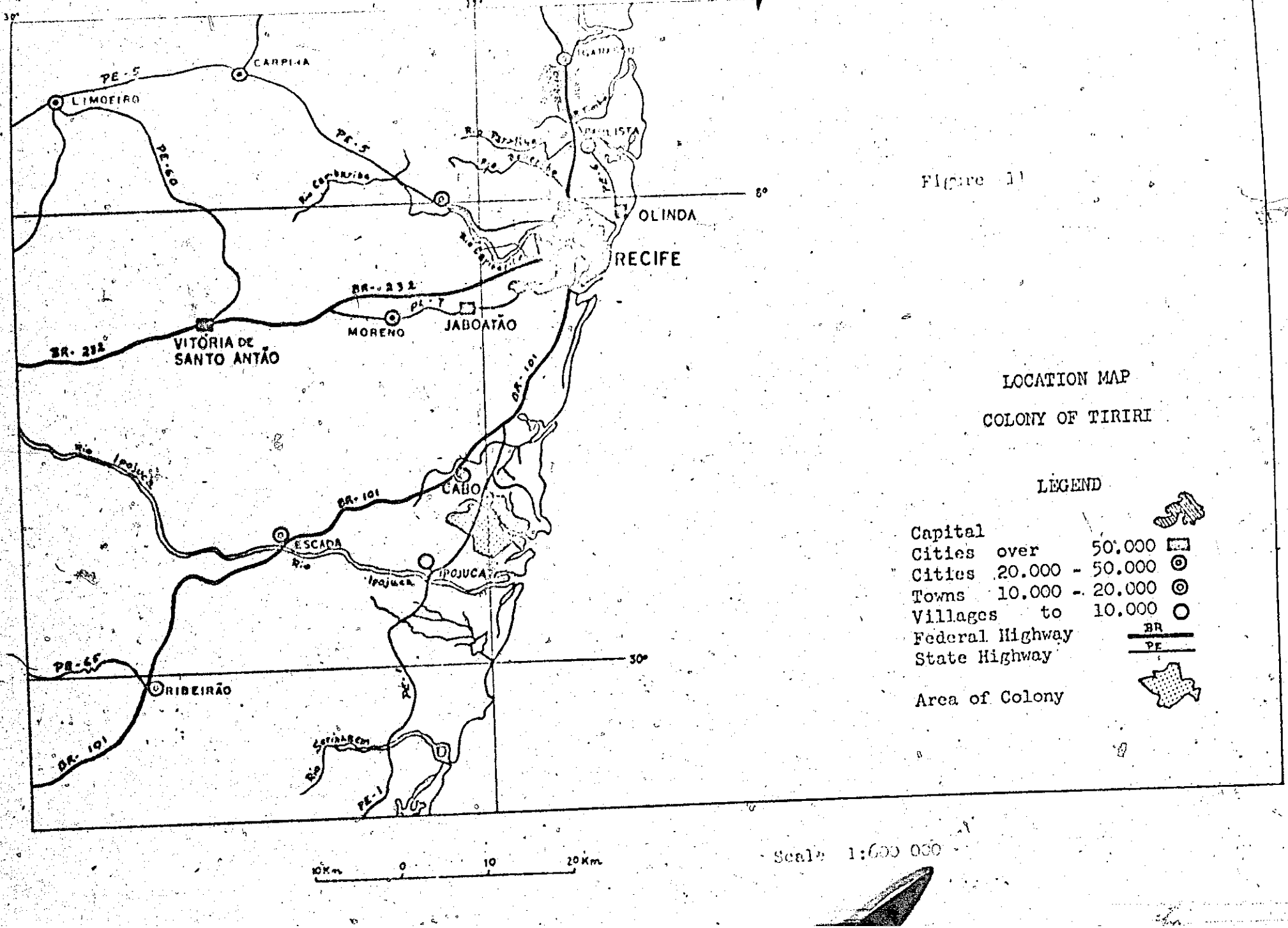
[1] Before the Railway Company bought the property, it was part of a large engenho known as Tiriri which belonged to the Usina Santo Inácio, near Cabo.

Figure 1


CARPINA
LIMOEIRO
PE-5
PE-60
R. Capibaribe
OLINDA
RECIFE
BR-232
MORENO
JABOATÃO
VITÓRIA DE SANTO ANTÃO
BR-101
CABO
R. Ipojuca
ESCADA
IPOJUCA
PE-65
RIBEIRÃO
SERINHAÉM
PE-1
8°
30°
10Km 0 10 20Km
LOCATION MAP
COLONY OF TIRIRI
LEGEND
Capital
Cities over 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to 10.000
Federal Highway BR
State Highway PE
Area of Colony
Scale 1:600 000

Topography is strongly undulating with slopes ranging from 25 to 40 per cent. Predominant soils are acidic, deeply weathered dark brown and reddish clays and sandy clays; climatic conditions are similar to those described for Cabo. Most of the area was wasteland which, in the earlier days of the Railway Company, provided firewood for locomotives.

The land was acquired in 1962, and a portion of it was distributed among 30 families which were selected from some 80 moradores or squatters living in the area at that time. The following year, in April of 1963, SUDENE organized the Agricultural Cooperative of Tiriri, which had a nominal membership of 80 cooperados and included all of the official and non-official settlers of the area.

Rather than growing sugar cane, members were encouraged to plant food crops for their own needs, and to sell any surplus to the cooperative. A cooperative store was set up, which initially sold staple food items, which had been donated under the Food for Peace Program of the Alliance for Porgress. While these donations were not intended for sale, prices were lower than in the country stores of the neighbouring engenhos, and proceeds were to be used to establish a revolving fund and to build up a stock of locally purchased food items. Because of lower food prices at Tiriri, workers from the surrounding areas began to patronize the cooperative store, which soon became a popular meeting place. Dissatisfied with their own miserable condition, workers from the neighbouring engenhos were strongly impressed

with the advantages of a cooperative system, and simultaneously were stirred to action by the Peasant Leagues and rural labour unions (sindicatos) to fight for better conditions.

In the meantime, SUDENE technicians in Recife were occupied with the elaboration of a detailed plan for the Colony and Cooperative of Tiriri. This plan was never completed. With the growing discontent of sugar workers, strikes, and political demonstrations in many parts of the sugar zone, landowners began to fear the worst from the peasants. Adding to their fears were rumours that the minimum salary of workers was to be more than doubled.[2] To defuse a potentially explosive situation and to avoid serious financial losses, Rui Cardoso, owner of two sugar mills and of the five engenhos surrounding Tiriri, had a novel plan which ought to have been beneficial to all concerned. He offered to rent to SUDENE the five engenhos next to the Cooperative, - Algodoais, Jasmin, Serraria, Massangana, and Tiriri, comprising a total area of 4,000 hectares (Fig.12) for an initial period of ten years. Under SUDENE's administration, the land would continue to supply sugar cane to his mills; he would be rid of several hundred malcontent workers and would reduce his labour costs, while SUDENE would be able to extend its cooperative scheme to the sugar industry.

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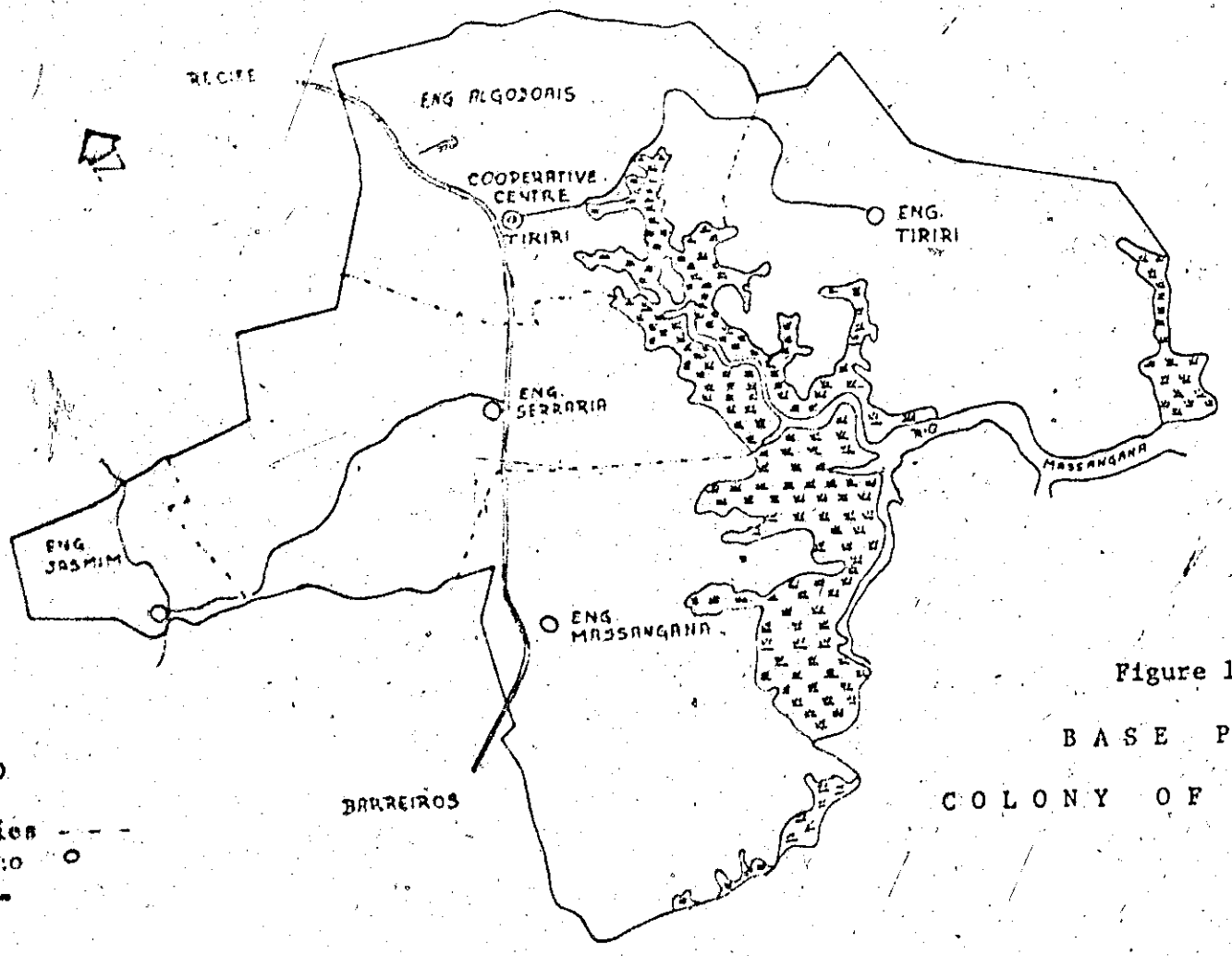
[2] In June of 1963 the Federal Government passed the Estatuto do Trabalhador Rural, which increased the minimum wage of rural workers from Cr$200 to Cr$503 per day (equivalent at that time to U.S.$0.32 and $0.80 respectively).



LEGEND

Engenho Boundaries - - -
Center of Engenho o
Ponds
Marsh

Total Area: 4,136 ha

Figure 12

B A S E P L A N

C O L O N Y O F T I R I R I

0 1 2 3 4 Km

Despite loud protests and opposition from other sugar mill owners and cane growers, who feared that a dangerous precedent was in the making, Cardoso persisted in his offer, which SUDENE accepted.

Thus, almost overnight, and only two months after the Cooperative of Tiriri had been established, SUDENE found itself in the scarcely enviable position of having to administer a 4,000 hectare sugar estate and of trying to still the clamor of some 560 disenchanted cane workers that were living on the five engenhos.

Under the terms of the contract,[3] SUDENE was to rent the land for ten years with the option of buying at the end of that period. If for any reasons the contract was broken or terminated, the land was to be returned to its owner in the same or better condition than before. Land already planted to cane was not to be put to any other uses. All cane was to be processed in the landowner's sugar mill unless permission was granted for processing elsewhere. SUDENE was to pay a rent of five per cent of the value of 32,000 tons of sugar cane annually. If this production quota was not met, the rent was still to be paid on that amount, but in addition, SUDENE was to pay a fine of fifteen per cent of the value of the difference between actual production and the fixed quota. On the other hand, to avoid over-

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[3] SUDENE, Contrato de Locação de Prédios Rurais Que Entre Si Celebram a Usina Santo Inacio S/A, e a Cooperativa Agricola de Tiriri Com Interveniencia da Usina Salgado S/A, Para Arrendamento dos Engenhos Tiriri, Massangana, Algodoais, Serraria e Jasmim; SUDENE, Mimeo., Recife 1963.

production, the sugar mill would accept an excess above the quota limit of only 3,000 tons.

The exact nature and inflexibility of the terms of the contract made the formulation of a rational production and development plan for the area exceedingly difficult. Only about a third of the total area of 4,136 hectares was fair arable land, all of which was planted to sugar cane. Most of the remaining area consisted of steep, forest covered slopes, poorly drained valley lands, salt marshes and swamps. Given these physical constraints, and the need to meet the required quota, crop diversification was all but impossible. Similarly, because of the imposition of a maximum quota and the stipulation that the area planted to cane cannot be reduced, there was no incentive to increase productivity and output per hectare, in order to liberate some of the better land for other crops.

Confronted with these technical and legalistic difficulties, SUDENE, in addition faced the complicated task of establishing for the project a workable system of administration, and of organizing production to meet the narrowly defined commitments of the contract.

Problems began almost from the day SUDENE assumed control of the project in July of 1963.

The half-completed plans for the Cooperative of Tiriri were put aside. The cooperative was to devote itself almost exclusively to the organization and promotion of cane production.

In addition to the original 80 members of Tiriri, all workers living on the five engenhos were to become eligible for membership. The original group was incensed over this turn of events and the elected administrative council of the cooperative refused to comply with SUDENE's request. Negotiations remained dead-locked until December of 1963, at which time the members of the administrative council renounced their association with SUDENE and their membership in the cooperative. The remaining members followed the example of their leaders, with the result that the original Cooperative of Tiriri ceased to exist. In the meantime, however, SUDENE had already made provisions for a new cooperative which took the same name, and for the construction of a cooperative center on the Engenho Algodoais, close to the paved road which runs through the middle of the five properties.

The new cooperative elected its own president and administrative council. It hired an office and supervisory staff of forty people, including five administrators, to oversee the affairs of each of the five engenhos. Most of the staff of the cooperative was made up of local workers. Administrative expenditures were to be paid out of the proceeds of the cooperative. SUDENE secured the initial working capital, and provided a staff of eight to ten technical advisors, including a project director.

The land was to be worked collectively, although those who wanted to work their own parcel of land were given the option to do so.

Since under this new scheme, workers were to be guaranteed steady employment, and a secure income, as well as other benefits, there was little incentive for such private effort, and it was not until the latter part of 1964 that a few workers made requests to plant cane on their own.

Financially, the project was off to a bad start. SUDENE's budget for the project was drawn up prior to the announcement of the new minimum wage and, although some allowance had been made to cope with such an increase, the new required wage for rural workers was much higher than had been expected. The result was that instead of paying workers at least the minimum wage, providing them with social benefits, and dividends from the profits of the operation at the end of the harvest, SUDENE and the cooperative were hard pressed to meet their minimum legal obligation. Funds which originally had been allocated for the purchase of livestock, fertilizer and equipment, and for the improvement of roads and the construction of new buildings were absorbed by the weekly wage bill.

There were few social benefits. Workers who had expected quick results and improvements in their lives became impatient and disillusioned. They were hardly better off than the workers on other plantations who were also receiving the new minimum wage. When rumours arose that the cooperative might not be able to pay the weekly salary, workers followed the example of others and went on strike, wasting many days of badly needed labour.

Since there was little time in which to prepare a plan before SUDENE assumed control of the plantation, and because of the limited staff SUDENE was able to provide, there was no orientation of workers about their responsibilities and about the objectives of the program. Some thought that the cooperative owned the land, and that through their membership they also became part-owners and hence could not be forced to work. Some spent days and weeks on end doing nothing, others misused the equipment entrusted to them; the most embittered looted the property and burnt the cane.

During the first harvest, 1963/64, the cooperative furnished less than fifty per cent of its production quota of 32,000 tons of cane. The rent of five per cent and the fine of fifteen per cent had to be paid as stipulated in the contract. Under these circumstances, the cooperative was unable to show a profit. To assure the survival of the project, SUDENE had to cover the deficits of the cooperative as well as to provide the operating capital for the following year.

The Revolution of March 1964 brought a reorganization of SUDENE and change in the administration of Tiriri. SUDENE's new staff took a much tougher line in the administration of the project. Strikes and demonstrations were forbidden by government order, the cane-workers went back to the fields, and gradually some order returned.

The price to be paid for the neglects of the canefields during the period of unrest was high. The fields had been poorly tended and not enough new cane was planted. The result was that the

harvest of 1964/65 was even lower than the previous year's, thus further aggravating the already precarious financial situation of the cooperative and increasing SUDENE's commitment. The harvest of the following year was somewhat higher but was still less than 50 per cent of the quota specified in the contract. The area worked collectively yielded 12,706 tons of cane, while the eight members of the cooperative, who, by that time, were planting on their own, furnished a total of 844 tons.

It was not until the fourth harvest (1966/67) that the cooperative was able to meet its quota for the first time with a total production of 37,181 tons. However, by that time the financial position of the cooperative had become all but hopeless. Its balance sheet for the 1966/67 fiscal year, dated June 30, 1967, shows total fixed assets of U.S.$15,880,[4] cash on hand of $4,200, and accounts receivable, including loans to members and the estimated value of the cane for the following harvest, of $123,800. Loans outstanding to SUDENE for the period from July 1963 to June 1967, at the devalued currency of June 1967 totalled NCr$762,000 or U.S.$282,222. However, if calculated on the basis of the exchange rate at each contribution data, the actual dollar value of SUDENE loan funds provided for the project was equal to U.S.$558,073. Without having made any payments on loans

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[4] Calculated on the basis of the June 1967 exchange rate.

outstanding to SUDENE, the losses of the cooperative for the fiscal year 1965, 1966, and 1967 were equal to U.S.$99,500, $61,800, and $44,400[5] respectively.[6]

While the cooperative, by all estimates, should have shown a profit for the 1966/67 production year, or at least break even in its operation, the sugar mill, quite inexcusably, failed in its duty to collect the cut cane from the engenhos. Bitter and helpless, the workers and planters watched the cut cane dry up in front of their eyes. SUDENE attempted to rescue the situation and sent in a few trucks, but when the cane was finally collected, it had lost much of its sugar content and value. The cane did not meet the quality standards specified in the contract. Once again the cooperative and the workers lost out. The price paid for the cane was for the lowest grade.

Because of the cooperative's serious financial situation, which was further aggravated by SUDENE's increasing difficulty in raising funds for the project, there were no dividends to workers and few social benefits. They were paid the legal minimum salary, which never was enough to support a large family. They had also lost their patrão, and many of the traditional ties to which they were accustomed had been severed. SUDENE's impersonal administration, which by that time had

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[5] Calculated on the basis of the exchange rate for June 1965, 1966, and 1967.

[6] SUDENE, Cooperativa Agrícola de Tiriri, Ltda; Mimeog.; Recife, Sept. 1967.

been reduced to a local staff of four technicians, hardly provided the strong paternalistic image the workers sought. If anything, they felt that SUDENE was to be blamed for everything that had gone wrong.

Dissatisfied, and with little faith in the efforts of SUDENE and the cooperative, many workers felt that they could improve their situation by planting on their own, and an increasing number made use of their option to a parcel of land. While all workers were to have this option, planters were elected by members of the cooperative from among volunteers. Very few were refused. The number of planters increased from a mere eight in 1965, to 76 in 1966, and 106 by the middle of 1967. Individual parcels of land were assigned by the cooperative and ranged in size from one to fifteen hectares, depending largely on how much land a member wanted and how much he could effectively work. There were few regulations. Those who received land were to plant sugar cane, pay a rent of ten per cent to the cooperative on the value of cane produced,[7] and pay any workers to be hired the legal minimum wage. Because of previous difficulties in meeting the annual production commitment, no quota limits were set for individual planters.

The results of the first group of planters were disappointing. Average production was only 14 tons of cane per hectare, as compared

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[7] Five per cent for the rent of land and five per cent to cover the expenses of the Cooperative.

to an average of 30.8 tons for the area worked collectively. However, later harvests indicate that the lag in production was largely a question of time for readjustments to take place. By the time of the 1966/67 harvest, independent planters were already obtaining an average production of 35.7 tons per hectare, although productivity on the collective area had also increased to 40.4 tons. This difference was almost entirely due to the fact that on the collective land, fertilizer was applied at planting time as well as for the first ratoon crop, whereas individual growers only used fertilizer at planting time. The effects upon productivity are reflected in the following statistics:[8]

	First Crop Tons/Ha	Ratoon Crop I Tons/Ha	Ratoon Crop II Tons/Ha
Collective Area	49.0	42.3	30.0
Planters	54.9	34.9	17.4

In 1966/67, planters spent an average of only $26 on fertilizer per hectare of cane, as compared to $52 spent by the cooperative for the same area on the collective land. Ironically enough, the additional five tons of sugar cane obtained by the cooperative would not cover the additional cost of fertilizer.

The harvest of 1967/68 produced a record crop of 39,401 tons by the cooperative on 732 hectares of collective land, and 12,673 tons

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[8] SUDENE, Cooperativa Agrícola de Tiriri, Ltda, Recife, 1967, p. 12.

by 106 individual planters, who held a total of 286 hectares. Productivity also increased to 53.8 tons of cane per hectare for the collective area and to 44.3 tons for individual growers. The entire crop was sold. To take care of the excess of production over and above the specified quota, arrangements were made with another sugar mill.

Despite this seemingly favourable turn of event in the life of the cooperative, the balance sheet of June 1968 showed a staggering loss of U.S.$83,000. To achieve economies, other plantations throughout the region were reducing their labour force and were turning to the less costly method of hiring workers on a daily basis, in accordance with needs. Tiriri, in an almost desperate attempt to raise its volume of production, not only maintained a labour force of over 400 workers on a year round basis, but also hired extra help during the planting and harvest season. Adding to these costs and increasing the losses of the cooperative, was poor judgement in the use of fertilizer and of other costly inputs. The cooperative's staff also had increased in size, which helped little, however, in reducing the growing tension between the local management and the people. The president and members of the administrative council not only occupied some of the choicest parcels in the project, but also were visibly growing in prosperity and made no effort to hide it. In surveying the pitifully small fruits of their own labour, many of the planters and workers concluded that not all was well in the management of their affairs.

SUDENE, by that time had all but withdrawn its technical staff and limited its activities in the area to basic surveys in preparation of a detailed plan. SUDENE hoped that it could gradually relinquish its control over the project, to the Brazilian Institute of Agrarian Reform (IBRA). Some agreement was reached between the two agencies about the future of Tiriri. However, by that time (Mid-1968), IBRA was already deeply involved with Usina Caxangá,[9] and did not have the personnel and financial resources to take on another project with almost identical problems.

As the harvest season at the end of 1968 was approaching, many of the workers and planters felt that they could no longer endure the situation. They felt betrayed and cheated. Once again trouble seemed imminent.

A delegation, headed by Padre Melo, the parish priest for Cabo, submitted a petition to the state governor, pleading for the immediate intervention by the government. The case was handed over to the Ministry of Labour of the State of Pernambuco, which, on October 11, 1968 appointed an interventor. The intervener was given full sanction of the government to undertake whatever action was necessary.

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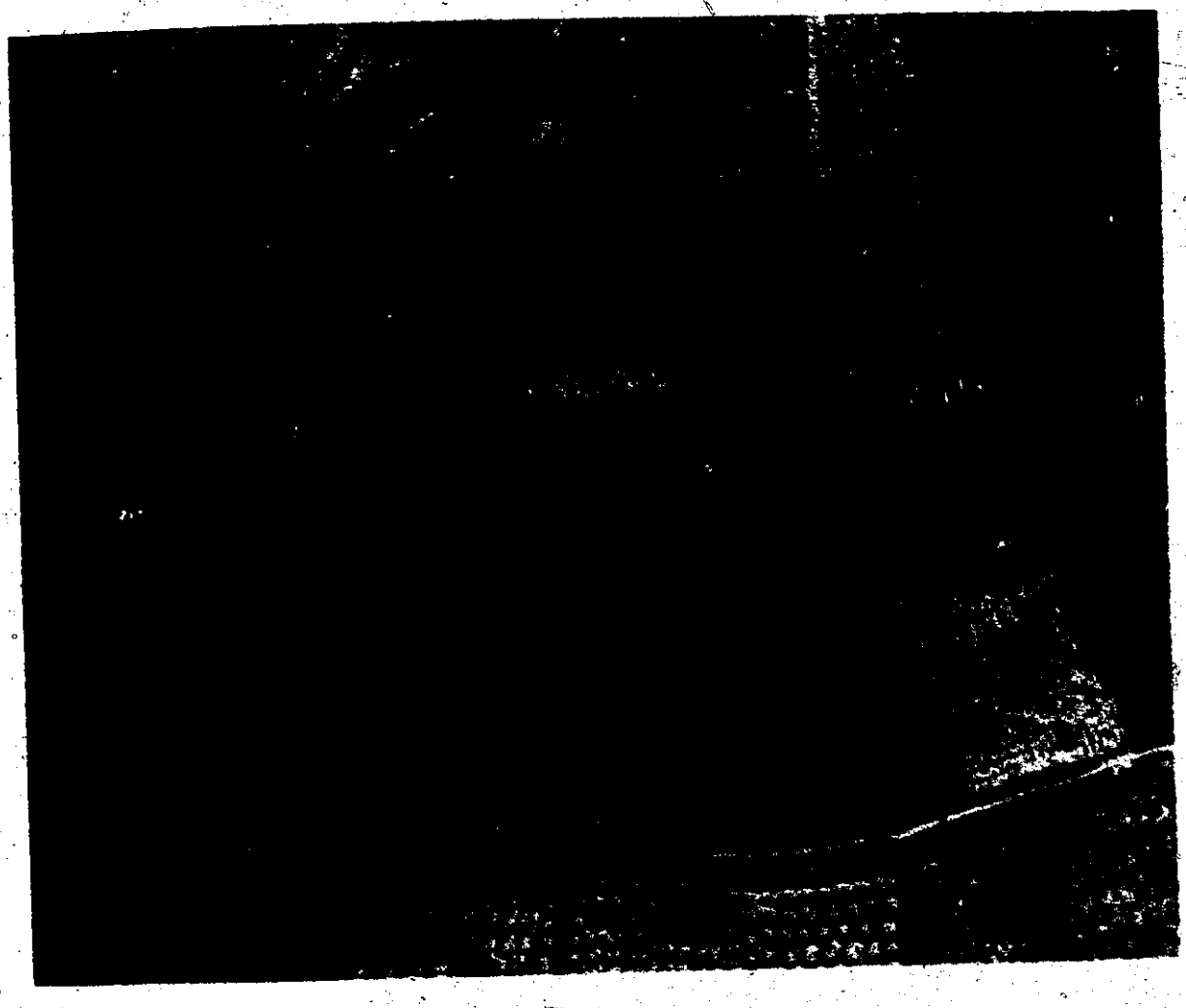
9. Usina Caxangá, a large sugar mill with 15,000 hectares of land in the Municipality of Ribeirão, Pernambuco. Caxangá went bankrupt, and in 1965 was expropriated by IBRA, to become the first agrarian reform project in the N.E. sugar zone, under federal government auspices.

By Brazilian standards, the person appointed seemed an unlikely choice. He is a fairly recent employee of the Ministry of Labour and also a fourth year student in philosophy at the Federal University in Recife. He is in his mid-twenties and has had no experience in agriculture, or in dealing with the type of problem he was confronting. Despite these seeming handicaps, his accomplishments since the time of his appointment are impressive.

At the time the intervention became effective, Tiriri had 107 planters and 425 salaried workers. Within the first five weeks, all of the previously collective land was divided into lots of 8 to 20 hectares each. The 425 workers were given the choice of accepting a lot, of staying on as salaried workers, or of leaving the project. Of these, 113 accepted lots, of which two thirds were accommodated on the collective land, while the other one third were settled on other arable land which previously was little used. Of the remaining 312 workers, 132 decided to stay on as assalariados, and were assigned one hectare subsistence lots on which they were to live and build their houses, 180 workers left the project, of which some were given land in a nearby parcelization scheme of Padre Melo.

The cooperative was closed; its president, administrative council and staff of 42 office and field workers were dismissed. An additional 14 workers who were also on the payroll of the cooperative, but whose duties were not defined, were relieved of their guns and pistols, and were also sent away. Only one watchman was retained to guard the store and offices of the cooperative.



Settler breaking new Ground at Tiriri

The old sensalas[10] were torn down, and the bricks and timber were given to workers and planters who had lived in these row-houses, and who were ready to built houses on their own parcels of land.

The intervention also assured that all workers were paid the minimum wage and received their 13th month bonus at the end of 1968, a legal requirement which had not been honoured under the previous administration.[11]

In the meantime, a new type of settler organization, which again goes by the name of Cooperative of Tiriri, has been re-established. The new organization is relatively uncomplicated in structure and operation. It makes maximum use of the self-help principle, it provides settlers with an opportunity to become involved in many of the decisions affecting their own lives and activities within the project, and it greatly reduces the possibility of collusion and fraud.

At the bottom of the new system are the settlers who are organized into small groups. Every five settlers, usually having adjoining properties, form a group. Each group elects a leader from among its members. Group leaders can be replaced at any time by a majority vote.

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[10] Row houses for sugar workers, common on sugar plantations throughout the region.

[11] The 13th month bonus is equal to one monthly salary and is paid at the end of the year. It is required by law, and any regular worker, other than those contracted on a daily basis (diaristas), are entitled to receive it.

Also, by common consent, any of the five members can act as substitute representative for the group. Each group meets whenever necessary to discuss questions of individual as well as mutual concern.

At the next higher level of the organization is the union of planters. Each union consists of ten groups, representing a total of fifty settlers. The leaders of the ten groups form the executive of the union, who elect among themselves a president, vice-president, secretary and controller. Office is held without remuneration, for a period of two years, and is renewable. Any member can be removed by a simple majority vote. The executive meets twice every month in one of the homes of the ten members. The function of the union executive is to deal with problems presented by individual groups, to decide upon general production programs, to assist settlers in the procurement of farm supplies and credit, to make arrangements for the transport and sale of sugar cane, and through its controller, to assure that each settler is paid in accordance with the quantity and grade of sugar cane delivered.

At the top of the organizational hierarchy are the directors of the cooperative, including a president, vice-president, secretary, and two controllers. They are elected in a general assembly of all members of the cooperative. Any member may be nominated and elected for any of these positions. The directors hold position for a period of four years. They are expected to volunteer a portion of their time to the affairs of the cooperative. Except for expenses paid by the cooperative, they do not receive any form of remuneration.

The directors of the cooperative act as the official representatives of the settlers of Tiriri. They are responsible to deal with problems brought before them by the executives of the different unions, to deal with banks to secure credit for members, to negotiate with sugar mills for favourable sugar cane prices, to negotiate bulk purchases of fertilizer and other farm inputs, and to solicit the help of various government agencies in matters of health, education, community development, and agricultural extension.

The directors of the cooperative work under the close guidance of the young intervener. The only salaried staff are two clerks who handle routine business matter. Some assistance in business management is provided by an accountant and farm management instructor from a nearby agricultural college, who volunteers part of his time to the cooperative.

With the intervention and the reorganization of the cooperative, financial procedures were completely modified. SUDENE had relinquished its control over the project and no longer felt responsible to absorb the previously staggering losses of the cooperative. IBRA on the other hand, still was not in a position to do more than acknowledge its intention to take charge at some later date. It became a decision of necessity as well as foresight that the colony and cooperative was to stand or fall by its own limited resources.

With SUDENE funding terminated, the cooperative's revenue was limited to income from the rental of a tractor and two trucks left behind by SUDENE, from the sale of sand, and a few tons of coconuts

produced on land which was not suitable for parcelization.

The responsibility of paying salaried workers, which previously rested exclusively with the cooperative and which was abused by showing salary expenditures for work that was never performed and for non-existent workers, now became the responsibility of the individual settler. The 132 individuals who decided to remain at Tiriri to work as assalariados for settlers, were encouraged to become members of the Rural Workers Union of Cabo, which would provide them a means of recourse in the event of any grievances which may arise.

Production and consumption credit, which was previously disbursed by the cooperative, is now paid directly by a bank in Cabo to the individual settler. A settler requiring credit presents his case to his group leader, who in turn informs the executive of his union of planters. The executive examines the request. If it is found to be within the settler's capacity, the directors of the cooperative are notified, who will authorize the bank to issue the loan. In the case of fertilizer purchases, settlers are required to inform their respective union of planters by a specified time of the quantity required. The cooperative then makes a bulk purchase, and authorizes the bank to make a loan for payment directly to the supply company.

At harvest time, all cane is sold through the cooperative. Payments made by the sugar mill buying the cane, are deposited in the bank. The bank makes deductions on settler's outstanding accounts, and turns the balance over to the cooperative for payment to settlers.

While the new organization of the settlers of Tiriri still lacks many of the attributes, functions, and powers of a typical farmers cooperative, the arrangement described here encourages meaningful group action and provides a sound basis for the critical learning processes which are pre-requisite to the establishment of a viable cooperative system. To prepare settlers for wider responsibilities in the management of their cooperative, the intervention has also made provisions for the training of potential leaders in cooperative philosophy, development, and administration. By the end of 1969, a total of thirty settlers had already received specialized training at the Rural Training Center of Pernambuco (CETRUP).

As the result of the earlier negotiations between SUDENE and the National Institute of Agrarian Reform (IBRA, now INCRA, National Institute of Colonization and Agrarian Reform), in May of 1970, INCRA finally proceeded with the expropriation of the five engenhos comprising the project. At this time, the project of Tiriri came under the jurisdiction of INCRA. INCRA has not finalized its plans for the colony. The intervener was appointed interim administrator until further actions by INCRA are possible.

The land was acquired for an average price of U.S.$75 (equiv.) per hectare. The rental and cane production contract with the previous landowner was terminated, although his mill will continue to buy sugar cane from Tiriri.

At the time of the survey, little information was available about the future tenure status of the settlers and workers living in the

colony. However, it is fairly certain that INCRA will exercise its legal mandate, and make provisions for the eventual distribution of property titles to the families of Tiriri.

7.2 Conditions in 1970

While it is too early to assess the full impact and effect of the changes that were made at Tiriri, there is ample and convincing evidence of progress.

Because of the distribution of the land, the reduction in the labour force, and the other changes that were made, the first harvest under the intervention for the 1968/69 cutting season showed a precipitous decline in production from an all-time high of 52,000 tons for the previous year to 29,000 tons. Since the contract with the sugar mill was still in force, the fine was levied once again and had to be paid. Yet, even after deductions from settlers' receipts to cover this penalty, they were paid out proportionately larger amounts per ton of cane than in any previous year.

While the new management was still burdened with the enormous debt left by the previous administration, and had not commenced any payments to SUDENE, the cooperative ended its 1968/69 fiscal year (in June of 1969) with a profit of U.S.$9,700 (equiv.). Incredibly, it was the first positive balance in the six year history of the Colony and Cooperative of Tiriri.

Cane production for 1969/70 increased by 18 per cent over the previous year, to 34,320 tons. A loan equal to U.S.$5,000 by the

National Institute for Agrarian Development (INDA) in 1969, was paid back in full. Miscellaneous debts in the amount of $9,643 left behind by the previous administration were paid off. Settlers paid back a total of U.S.$26,880 (equivalent) in loans they had received before the intervention. Up to the end of June 1970, new loans equal to a total of U.S.$21,600 were given to settlers and salaried workers. "Receipts and Expenditures" of the new administration for the 1969/70 fiscal year showed a balance of U.S.$3,924.

There are few frills or extraneous expenditures. Settlers and workers make contributions to the National Health Insurance Plans (INPS), but health services are only available at the Town of Cabo. There are five schools staffed by 17 teachers who are paid by the State Department of Education. A truck and two tractors, left behind by SUDENE and still in working order are rented to settlers on a cost basis. As already pointed out, credit is available to all families through a local bank, however, pending further improvements in settlers' income position, the maximum amount a family could borrow in 1970 was limited to U.S.$130 (equivalent). Except for the fiscal actions of the union of planters, no supervision is given in the use of credit. Annual interest rates were increased to nine per cent from the prevailing rate of four per cent under the previous administration. As noted earlier, arrangements are made for the pickup, transport, and marketing of settlers' cane. However, the sale of all other products is the responsibility of the individual.

Interviews with 29 settlers showed that some were deeply embittered about the changes that had been made. As many as 12 respondents complained about the new administration, although, only one of these indicated that he would like to leave the colony. Most vituperative in his remarks about the young director and the new order of things, was one of the former members of the administrative council of the previous cooperative. He lamented that in the days of SUDENE they had everything: medical care, technical assistance, production and consumption credit, tractors and implements, but that all of that was changed. Now, he complained, there is no credit, no assistance whatever, those who are sick and have money get help, those who don't, wait for luck or die. He accused the new administration of stealing, of "taking the bread from innocent children", of tearing down houses and leaving the inhabitants homeless, of having caused production to decline and of having created a great deal of unemployment and hardship for everyone. It was obvious however, that he was not suffering much hardship. With a gross income for 1969/70 equal to nearly U.S.$3,000, his arguments did not seem very convincing.

Despite the apparent austerity program of the new administration, formal interviews with settlers and informal talks with salaried workers indicate that for the majority, improvements in their situation have occurred.

Questions concerning changes in the level of living of settlers and their families were made with reference to the time before and after they were assigned a plot of land. On this basis, 63 per cent indicated

they now find it easier to feed and clothe their family than before, 18.5 per cent felt that there has been no improvement, and another 18.5 per cent indicated that their situation has deteriorated. With respect to the entire period since the time SUDENE assumed control in 1963, 73 per cent indicated that conditions for the education of their children have improved, while 53 per cent felt that medical assistance is better than before.

Except for two respondents who came from the Agreste, all remaining families, making up 93.1 per cent of the sample, came from the sugar zone. Most of the settlers had worked in agriculture all of their lives; 10.7 per cent worked for themselves while 75 per cent were agricultural labourers; the remaining 14.3 per cent did other types of work before coming to the colony. A total of 24 settlers had land before coming to the project, 22 of these held small subsistence parcels provided by their patrão, and two rented land and worked on their own.

7.3 Agricultural Practices, Activities, and Income

Agricultural practices at Tiriri do not vary significantly from those of the settlers at the CRC colony at Cabo.

Almost all settlers plant the same crops year after year. Irrigation is not used. The practice of burning the land prior to planting is followed by over 90 per cent of all respondents. In 1969, 24% made use of chemical fertilizers. Cross tabulation showed that five of the seven settlers using fertilizer had received their parcel before the

time of the intervention. Since the use of fertilizer was also significantly correlated with levels of gross income, it appears that the use of fertilizer is in part, a reflection of the capital position of settlers.[12] The use of insecticides is limited to ant poisons in connection with manioc and other root crops; 38 per cent used insecticides during 1969. Surprisingly, three of the settlers had oxen and used them to plow the land. Probing revealed that two of them were plantation workers who had experience with animals before they came to Tiriri. Only four of the respondents made use of the cooperative's tractor. In 1969, 89 per cent of the group interviewed borrowed money; loans ranged from U.S.$22 to $97.

Agricultural activities center almost exclusively upon the production of sugar cane. All respondents named sugar cane as their most important cash crop. The average area planted with cane was 3.9 hectares with a range from .5 hectare to 15 hectares. The simple correlation coefficient between the area planted to cane and gross income was r=0.896, suggesting that the area planted to cane accounts for approximately 80 per cent of all variations in gross income.

Normally, production follows a three year cycle, with the first crop 12 months after planting, and a ratoon crop in

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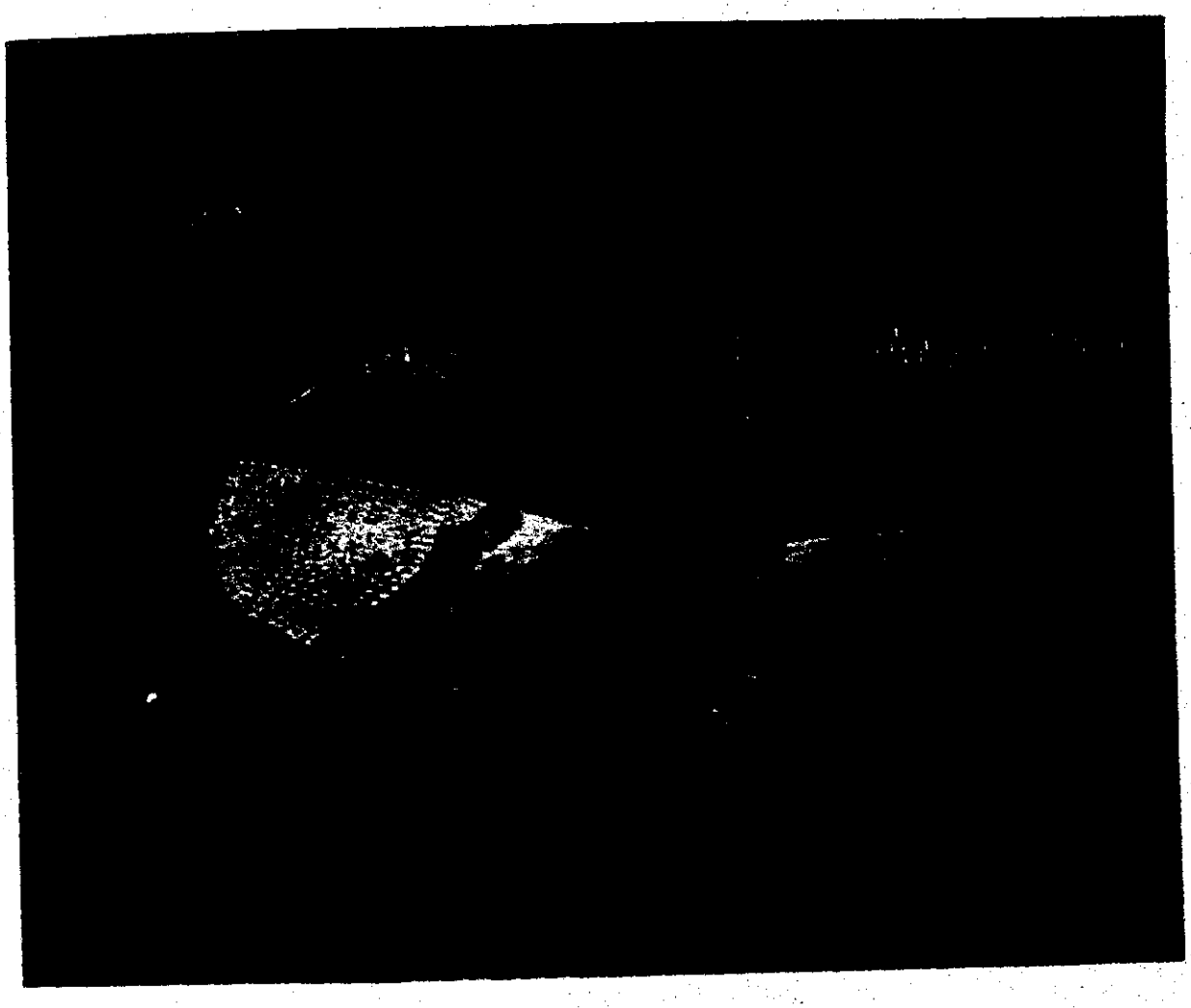
12 As pointed out earlier, fertilizer is sold by the administration on a pre-arranged basis, i.e. settlers are required to make advance orders. Because of the limited amount of credit available, most of the settlers buying fertilizer are already in a better financial position. (U.S.$130 in credit would buy only 3 tons of fertilizer).



Sugar Cane and Subsistence Crops

Typical Landscape at Tiriri

the second and third year. On the more fertile valley soils, three or four ratoon crops are possible. However, as was noted in the case of the settlers of Cabo, these areas are normally devoted to manioc and other subsistence crops.

Manioc and bananas are the only other crops of importance. Manioc was named the second most important crop by 76 per cent of the respondents and as the third most important crop by 14 per cent. Bananas occupied second place for 24 per cent and third place for 48 per cent. The average area devoted to crop two and crop three was 0.6 and 0.2 hectares, respectively. All remaining crops occupied an average of 0.1 hectare per farm.

Since over half of the families did not become settlers until after October of 1968, a balanced production situation will not be reached for at least another two years. The approximation, therefore, of the income position of the "average" settler shown in Table 5 is less representative than in the case of the CRC colony at Cabo. Settlers who received land prior to the intervention generally had higher gross incomes than those who were settled more recently. In 1969, a total of five settlers had gross incomes exceeding the suggested $1,500 required minimum. All of those had received their land before the intervention. This difference in gross incomes, relating to differences in the date of settlement would normally be much higher, but is somewhat mitigated by the fact that two thirds of the recently settled families were placed on the previously collective land, much of which was already planted to cane at

Product	Average Area Planted ha	Average Yields per Hectare	Total Production	Average Product Price U.S$	Total Value of Production U.S.$	Total Labour Required Man/Days
Sugar Cane	3.9	40 tons	156 tons	4.90/ton	764	499
Manioc Roots	.6	9,500 kg	5,700 kg			68
Manioc Flour			1,710 kg	0.14/kg	239	68
Bananas	.2	24,000 fruit	4,800 fruit	0.50/100fr	124	12
Total	4.7				$1,027	647 M/D

Potential Annual Gross Income: US$1,027

*Average Expenditures for Paid Labour: (95 days x $0.80) US$ 76
*Average Expenditures for Other Inputs: 84

*Average Expenditures Total: 160 160

Average Net Income: US$ 867

Total Family Labour (647 M/D less 95 M/D): 552 Man/Days

Estimated Average Returns to Family Labour: 867/552 US$ 1.57

Average Annual Gross Income of Sample: US$ 769 Minimum: US$ 22 Maximum: US$ 4,168

Proportion of Settlers in Sample with Annual Gross Income less than US$1,500: 82.6 per cent

*Based upon sample data

the time of the sub-division.

It will again be noted from the data presented in Table 5, that there is a considerable difference between the potential income of a settler planting 4.7 hectares of the crops listed, and the average annual gross income of the sample group. Detailed calculations for individual farms show that much of this difference can be accounted for by estimating the value of the product consumed by the family.

The range in gross incomes for the 29 settlers for the 1969/70 production year was from U.S.$22 to $4,168. The low income was due to portracted illness on the part of the head of the family, who was also unfortunate enough to receive a lot which was almost completely covered with brush and forest. The high income was obtained by a settler who has had his parcel for four years, and who plants 15 hectares of sugar cane with yields averaging close to 60 tons per hectare. He is using fertilizer on the first year crop, he also has seven hectares of nearly level land and makes use of the cooperative's tractor. His returns to labour were estimated to be close to $3.00 per man/day. Returns to labour are high because of greatly reduced labour costs per ton of cane. Economies are achieved through partial mechanization, but even more so, through yields that are 50 per cent above the average for the colony.

Statistics for plantations in the Northeast show that it takes approximately 3.2 man/days to produce a ton of sugar cane when yields are 40 tons per hectare and when all work is done by hand labour. Two thirds of this time is taken up for planting and weeding operations, and one third for cutting and bundling the cane. Thus, a field yielding 40 tons of cane per hectare would require 128 man/days in labour, while

double that yield would take up little more than an additional 42 days or a total of 170 days. In reality, the gains with increased yields are probably even more favourable. The second and third cleaning operations in a thick stand of cane normally require less time than in a light and patchy crop. Similarly, in the cutting operation, a man will find it difficult to cut and bundle more than a ton of light cane in a day, whereas in heavy cane with yields of 50 and more tons per hectare he will be able to cut and bundle 1.5 to 1.8 tons of cane per day.

It is evident from these observations, that considerable increases in the net earnings of settlers could be achieved through proper orientation in management practices, aimed at achieving higher yields. On the other hand, land capability, particularly with respect to topography, imposes very serious limitations which are not amenable to correction. The bundling of sugar cane, for example, requires a great deal of time, but is necessitated by the fact that in steep and inaccessible areas, the cane must be carried out with donkeys or horses. Furthermore, planting, weeding, and cutting cane on slopes of 30 or 40 per cent is far more cumbersome and time-consuming than on level or nearly level land. Through proper orientation, settlers might be encouraged to reverse their present practice of planting sugar cane on the slopes and manioc on the valley lands. With the use of fertilizer, improved varieties, and proper management, yields on such land in excess of 80 tons of cane per hectare are not impossible.

The position of salaried workers of Tiriri is still somewhat precarious. Although they are paid the minimum wage of $0.80 per day and are entitled to the 13th months bonus, at the level of production cited here, 220 settlers would not be able to keep 132 salaried workers fully occupied. However, if production increases can be achieved through the judicious use of fertilizer, settlers' return to labour will increase, and an increased demand for labour will lead to larger incomes of salaried workers. Also, since each worker has one hectare of land, he will be able to use up to 200 man/days of his own and his family's labour, if he plants manioc and does his own processing. Nevertheless, even with the best of effort, it is highly unlikely that the total income of a salaried worker can ever approach the level of income that is possible for a settler who plants five or more hectares of sugar cane, and who obtains yields of 40 or more tons of cane per hectare.

7.4 Conclusion

While SUDENE's plan in 1963, to establish a sugar cane cooperative at Tiriri, is highly commendable, it does seem incredible that six years and a great deal of badly needed capital had to be wasted before it was decided that the project was trying to support 180 workers too many.

As an experiment which failed and finally succeeded, Tiriri does offer its lessons of experience, albeit costly ones.

Anxious to try out a sugar cane cooperative, SUDENE chose

some very poor land, in fact the poorest land among all the 21 engenhos of the Cardoso Estate. While SUDENE may have had little choice in making this decision, less excusable are the rigorous terms of the contract to which the Agency agreed. In view of the fact that the landowner, in renting the five engenhos, was motivated almost entirely by economic necessity, a more equitable and reasonable contract would probably have been possible.

Once the project got under way, entrusting its management to some forty unprepared and untrained sugar workers was hardly a wise and justifiable decision.

After the Revolution of 1964, sight also seemed to have been lost of the original objectives of the project. SUDENE's new administration looked upon the scheme as something to be continued rather than upon its possibilities. Rightly or wrongly, it was felt that the onus for its failure rested with those who conceived the plan in the first place.

On the positive side, recent developments at Tiriri not only show the critical importance of capable leadership, but also offer enough evidence that the traditional arguments about the ignorant, incompetent and lazy peasant do not hold water. They have shown that even with very modest economic opportunities and a modicum of involvement in the decisions affecting their own lives, they are willing and capable of self-betterment and of real achievement.

PROJECT SUMMARY

TIRIRI

AGENCY: National Institute of Colonization and Agrarian Reform (INCRA)
LOCATION: Municipality of Cabo, near the Town of Cabo
DATE ESTABLISHED: 1963 by SUDENE
COST ESTIMATE: Insufficient Data
FUNDING: SUDENE, Bank of Brazil, INCRA

TYPE OF SETTLEMENT:
Size: 4,136 hectares Number of Lots: 220
Layout: houses dispersed Average Lot Size: 10 hectares
Tenure: not decided, eventual distribution of titles

PHYSIOGRAPHY:
Mean Annual Rainfall: 1670 mm. Mean Annual Temperature: 23°C
Wet Season: March to August Dry Season: Sept. to Feb.
Topography: Undulating to hilly, maximum local relief 60m.
Soils: Brown and Red Yellow Clays and Sandy Clays; Valley Soils, Salt Marshes and Halomorphic Soils

ECONOMIC DATA:
Principal Crops: Sugar Cane, Bananas, Manioc
Livestock: Poorly developed, some cattle
Services: Marketing of cane, credit, mechanical equipm.
Settler Incomes: Average Annual Gross Income U.S.$769
Range $22 to $4,168
Estimated Average Value of Production per ha. under cultivation: U.S.$218
Estimated Average Returns to Labour: U.S.$1.57 per Man/Day

SOCIAL DATA:
Average Family Size: 7.4 Average Age of Settler: 49.2
Services: Primary Education; Health Insurance Plan
Number of Families: 220 settlers, 132 salaried workers

VIII

THE COLONY OF RIO BONITO

8.1 History and Development

The Colony of Rio Bonito (Núcleo de Reforma Agrária Rio Bonito) represents one of the more successful ventures of land settlement in Northeast Brazil. Its beginning, however, and rather turbulent history are not atypical.

To visit the colony, one travels west from Recife for some 108 kilometers on paved Federal Highway BR-232 to the Town of Bezerros. Turning south on to a gravel road it is another 30 kilometers to the Town of Bonito, a small marketing and agricultural processing center, nestled amidst the hills of the Borborema Upland (Fig. 13). Leaving the town by a rough and narrow road which tortuously winds up the sides of a steep mountain, one is certain to stop the first peasant to ask anew for directions. Here and there, wedged between the slopes of a ravine, where water and a thin mantle of soil are found, a squatter is eking out a precarious existence. The rest is steep rock faces, boulders, and further up the mountain, dense forest, a most unlikely place for a land settlement. Reassured that this is the right road, one continues. Near the summit, the forest becomes thicker, the road widens and becomes smooth, with a surface of fine compacted clay and sand. Following this nearly level road for another two kilometers, one comes upon an expansive clearing, houses surrounded by fruit orchards and fields of vegetables, a stream and water reservoir, and the center of the colony.

The Town of Bonito. A small Marketing and Processing Center in the Transition Zone of the Coastal Region and the Agreste

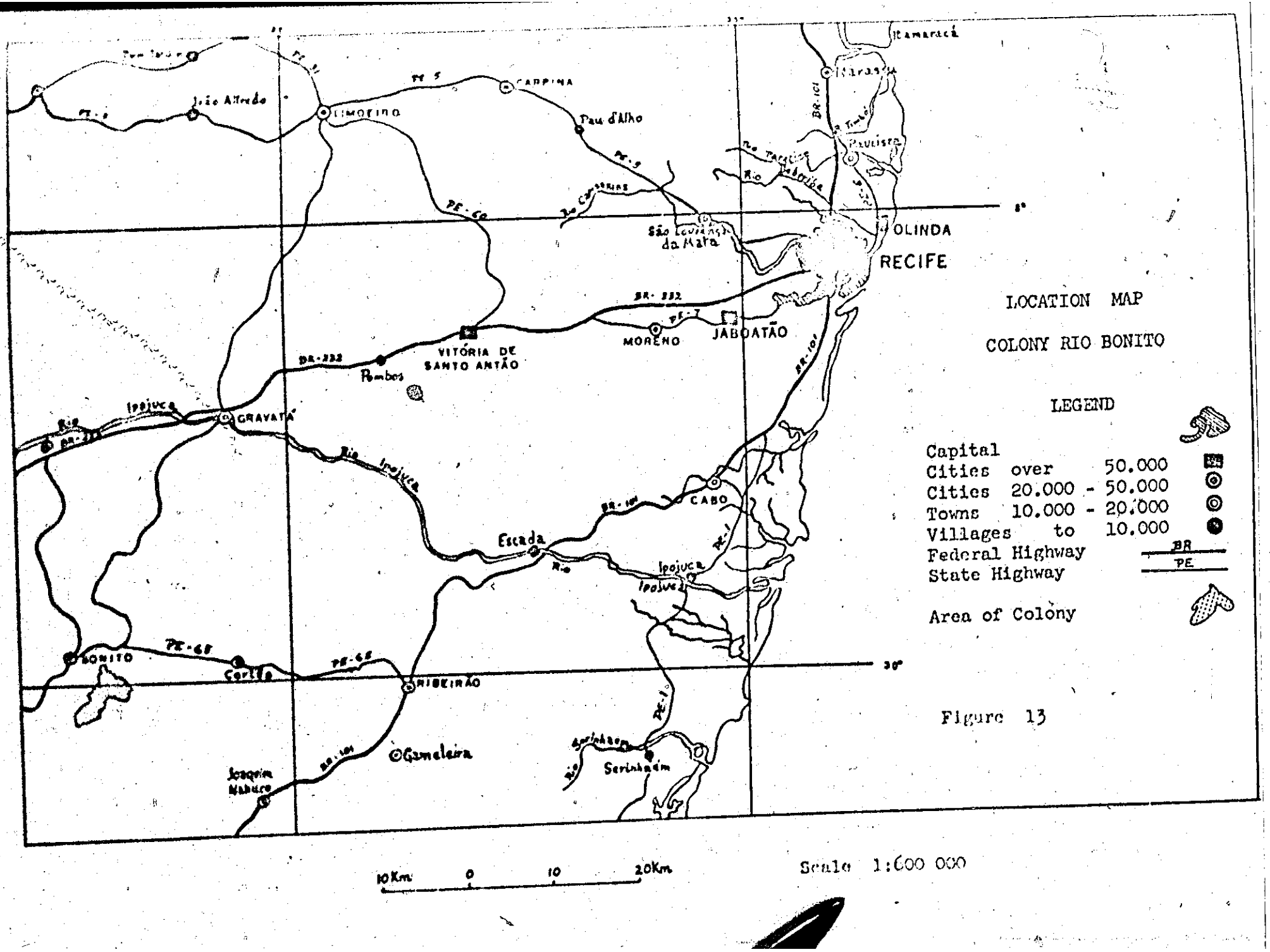

LIMOEIRO
CARPINA
Pau d'Alho
São Lourenço da Mata
OLINDA
RECIFE
VITÓRIA DE SANTO ANTÃO
MORENO
JABOATÃO
Pombos
GRAVATÁ
CABO
Escada
Ipojuca
BONITO
RIBEIRÃO
Gameleira
Serinhaém
Joaquim Nabuco
LOCATION MAP
COLONY RIO BONITO
LEGEND
Capital
Cities over 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to 10.000
Federal Highway BR
State Highway PE
Area of Colony
10Km 0 10 20Km
Scale 1:600 000

Figure 13

Here, in the Serra dos Ventos, the second highest mountain range in the State of Pernambuco, some 800 meters above sea level, the National Institute of Immigration and Colonization in 1955 bought 1,379 hectares of wasteland to establish the Colony of Rio Bonito.

Before the days of the colony, the area was part of a remote and forlorn fazenda which was only accessible by pack animal or with a four-wheel drive vehicle. During the last war, the place belonged to a German rancher, whose ambitions, however, had little to do with raising cattle. He operated a secret radio station, relaying messages and coded information to German U-boats passing off the Northeast coast of South America.

After the war, obsolete in its previous function, and of little use for farming, the property was bought for a bargain price by an individual who, it appears, had many influential connections. He hoped to convince the federal authorities of the time, that his fazenda was the ideal site for a colonization project.

The federal government sent out a team of specialists to investigate the situation, which came back to report that the proposed site was totally unsuitable for the establishment of a settlement. The site was considered too inaccessible and remote. The soils were found to be infertile, excessively drained sands of the tabuleiro type, that were classified as non-arable. In addition, without irrigation, even the production of subsistence crops would be all but impossible.

The report was not heeded. The government went ahead and

bought the land, and in 1955, turned it over to the newly created National Institute of Immigration and Colonization (INIC). The Institute's function was to implement the National Plan for Colonization, under which "green belt" and frontier colonies were to be established in different parts of Brazil, for the settlement of both immigrant and native families.

Implementation of Rio Bonito commenced in the early part of 1956, and the basic work of infrastructure development and the division of the land was completed the following year.

The layout of the project and the provision of various facilities in the Center reveal careful planning, and show all the "trademarks" of government colonization and adherence to government norms. Initially, there were 42 lots of 25 hectares each. Because of the combination of limited rainfall (568mm.[1]) and excessively drained soils, efforts were made to facilitate irrigation, by dividing lots in such a manner that each parcel would border on at least one of the several perennial streams which originate within, or traverse the colony. While most of the topography of the area is gently undulating, with slopes generally less than 20 per cent, some hill sides are too steep for cultivation, an additional factor which was taken into consideration in establishing lot boundaries. The colony has excellent roads, and

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[1] Rainfall data is for Panelas, 35 km. southwest of Bonito, and is lower than the actual rainfall at Bonito. Because of the high altitude, annual mean temperature is under 20°C. and evapotranspiration would be somewhat less than in most areas of the coastal region. The rainfall regime is the same as in the areas of the previously discussed colonies.

all lots are accessible by truck throughout the year. The original 42 houses built by INIC are stuccoed brick structures, that have cement floors, tile roofs, and were designed to accommodate large families. Attached to each house is a covered shed, an outside privy, and a place to wash clothes. In most cases, water is obtained from wells near the house. The base plan for the Colony is shown in Figure 14.

The Center (Fig. 15) is located in the northeastern part of the project, near one of the tributaries of the Rio Bonito. It contains an administrative office, a large, six-room school, a cafeteria for workers and a guest house, several residences for local staff, and a number of other buildings. On the 39 hectare site, land has also been set aside for experimental and demonstration purposes. Belonging to the Center are two tractors, several rotovators, two light bulldozers, two trucks, 20 pumps, and a complete line of irrigation equipment[2].

Under the National Plan for Colonization, each project was to have a composition of 70 per cent foreign and 30 per cent Brazilian families. However, in 1956, when the Rio Bonito project was ready for settlement, there were few immigrant families that were interested in agriculture, and who could be induced to live in the Northeast. With some effort and the help of the Japanese Consulate, INIC succeeded in bringing 15 newly arrived Japanese families to Rio Bonito. The remaining

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[2] Some of this equipment was acquired recently.

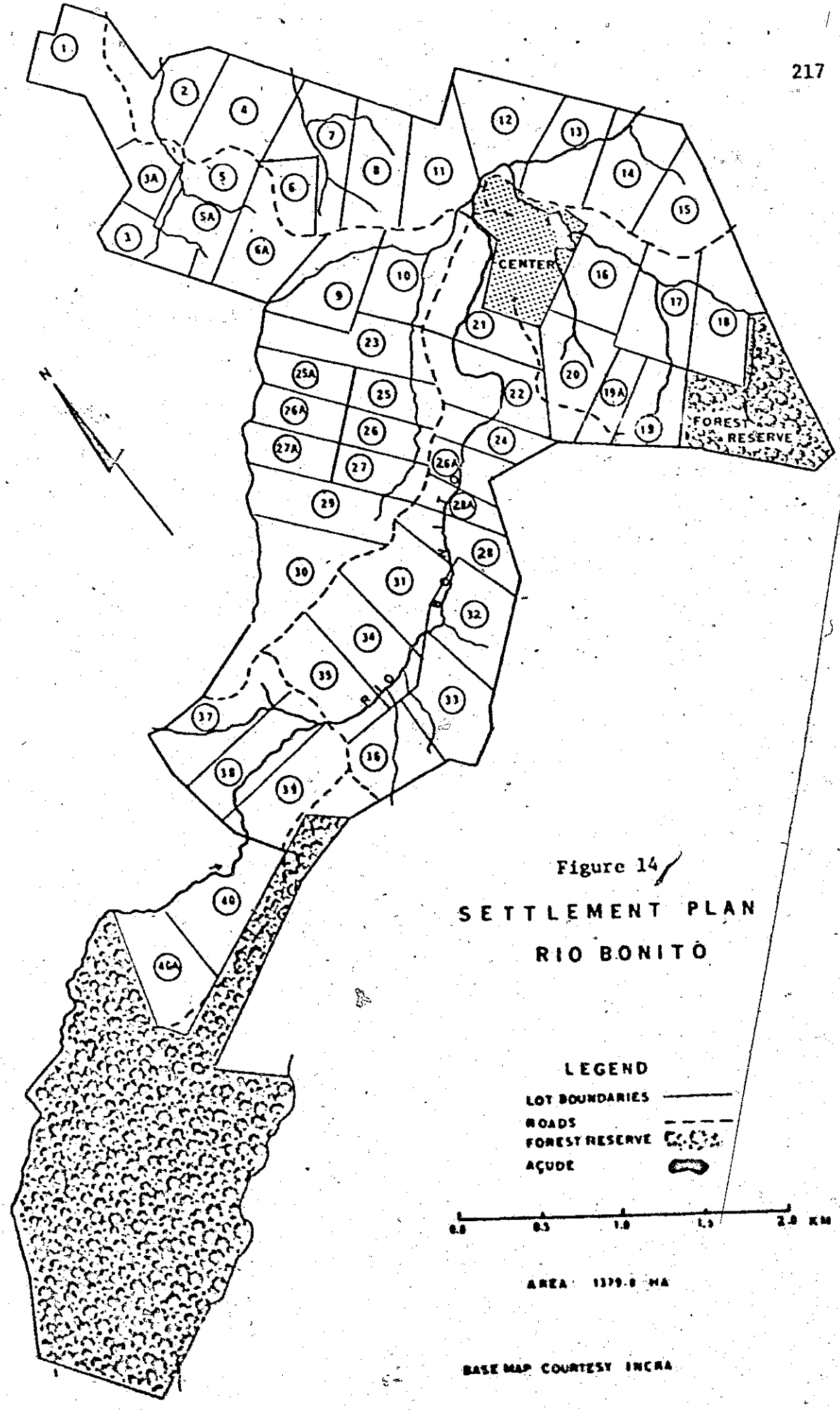

Figure 14

SETTLEMENT PLAN

RIO BONITO

Figure 15

Settlement Center - Rio Bonito

1. Admin. Office
2. Machine Shed
3. Admin. Residences
4. Cafeteria, Guest House
5. School
6. Pumphouse

R Settler's Residence

27 parcels were occupied by Brazilian families who came from the Agreste and the coastal region. Because of a very high turnover among settlers of both groups during the early years, the ratio of Japanese and Brazilian families has varied from year to year, although the latter have always been in the majority.

Early problems arose out of repeated crop failures, unfamiliarity of the immigrants with local agricultural conditions, insufficient technical and financial assistance, poor marketing arrangements, and the Agency's chronic financial difficulties and inability to provide the additional investment and support that was needed to make the project viable.

Brazilian settlers found that the land was too poor to provide more than meager subsistence, and fertilizer was too expensive. Efforts by the Japanese group to grow vegetables were frustrated by similar problems. Attempts to grow vegetables on a year-round basis were not successful. Once they had learned what they could grow and how, the small market of the Town of Bonito could not absorb their production, nor was there much of a demand for all the different crops they had to sell. Without a cooperative or other marketing arrangement, they were dependent upon middlemen. The introduction of passion fruit seemed to offer some prospect for a steady cash income; it could be sold to a large canning company in Bonito. In a short time, most of the Japanese and some of the Brazilian settlers were growing one or

two hectares of this exotic fruit. When the vines came into production two years later, it was too late to discover that they were completely at the mercy of the processing company, which was the exclusive buyer in the region and was able to set its own price.

In the latter part of 1962, INIC was superseded by a new agency, the Superintendency for Agrarian Policy (SUPRA), which was to assume responsibility for all matters pertaining to land reform and colonization. While SUPRA was relatively short-lived, the majority of the present settlers of Rio Bonito arrived shortly before and during SUPRA's administration of the project, between 1962 and the beginning of 1964.

With the passing of the Land Statute in 1964, and the creation of the Brazilian Institute of Agrarian Reform (IBRA), and the National Institute of Agricultural Development (INDA), SUPRA was phased out of existence, and its former responsibilities devolved upon the two newly-established government agencies.

Under the management of INDA, which was in charge of Rio Bonito for the next three years, many important changes were made. It was found that neither the Japanese nor the Brazilian settlers could cultivate more than three or four hectares of land. Consequently, ten of the parcels with the largest areas of land of reasonable topography, were divided in half, and the number of lots and of settlers was increased to fifty-two. The ratio of Brazilian to Japanese families after the change

was 34 to 18.

To achieve a more effective utilization of settlers' land, INDA also encouraged the planting of orange and guava orchards, and provided plant material and the necessary financial and technical assistance. The local staff was increased, and a resident agronomist and several agricultural technicians were assigned to the project. Other improvements made included the acquisition of additional equipment for use by settlers, the promotion of better agricultural practices, including the use of fertilizers and of pesticides, and a change in marketing arrangements by providing for the transport of settlers' products to the various markets of Recife. Believing that the liberal use of production credit by settlers was essential to their progress, INDA followed an "easy credit" policy, basing amounts of individual loans upon production potential rather than upon previous levels of performance.

INDA's efforts did not go unrewarded. The Agency took charge of the project in the beginning of 1965 and by the end of the year, the total value of sales of the colony had already increased by nearly 40 per cent from the total of the previous year of U.S.$30,000 (equiv.) to $41,819. The full effects of the program, however, were illustrated most dramatically by the end of 1966, when the total value of sales reached an all-time high of U.S.$232,929, an increase of 557 per cent over sales the year before.[3]

Overproduction and attendant price effects, as well as several other factors led to a decline of the total value of sales in 1967 and

[3] All dollar values based upon the exchange rate for December of the year in question.

1968 to U.S.$169,974 and U.S.$95,057 respectively. These values do not reflect a change in policy on the part of INDA or a decline in the agency's interest and involvement in the affairs of the colony. On the contrary, while pursuing a liberal and perhaps excessively paternalistic program of technical and financial assistance to settlers, INDA seems to have been completely unable to anticipate the possible dangers and negative effects of its production and productivity campaign. Because of the very strong production incentives and increased opportunities provided under INDA's program, the Japanese settlers, who were responsible for most of the increases, concentrated almost exclusively upon the production of vegetables which promised quick returns.[4] They doubled and tripled their area in crops, used large quantities of chemical and organic fertilizers, employed half the Brazilian families in the project, and specialized in those crops yielding the highest returns: tomatoes, carrots, green peppers, cantaloupes, and a number of others. While they were able to market directly in Recife, production efforts between families were poorly coordinated, with the harvest of certain crops coming to a peak for all producers at the same time. The result was a frequent market glut and serious losses, particularly with highly perishable produce. Undaunted by their earlier failures, they again felt that with a twelve-months growing season, certain crops could be grown all year round. The results were often serious crop failures

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[4] Except for longer-range investments by some settlers in the establishment of orange and guava orchards.

due to diseases and other causes.

There were other problems as well. One of the Japanese settlers in the colony had bought several pounds of cantaloupe seed from a seed dealer in the South. He planted one and a half hectares of the crop, which was to provide his major cash income for the year. When the plants began to set fruit, several months later, after having spend hundreds of dollar on labour, fertilizer, and pesticides, he discovered that what he had planted was an almost worthless variety of watermelon. Understandably, his comments about the Brazilian seed supply company were not very complimentary.

The most serious misjudgement of settlers and of INDA was in the use and management of credit. Instead of careful budgeting and a reduction in expenditures, the Japanese settlers invariably countered each loss with still greater effort, increased operating investments and larger loans. Backed by ample evidence of previous success, INDA on the other hand, had no difficulty in securing the necessary funds from the Bank of the Northeast and the Development Bank of the State of Pernambuco. By the end of 1968 the total credit debt of settlers was equal to U.S.$100,258. Of this total, $93,505 was owed by 18 Japanese settlers, or an average of $5,194 per farm, while the balance of $6,753 was owed by the 34 Brazilian settlers with an average of $198 per family.

In October of 1968, the administration of the project was transferred to INDA's sister agency, the Brazilian Institute of Agrarian

Reform. Because of the colony's location within the Northeast Agrarian Reform Priority Area, it was to be under the jurisdiction of IBRA. The transition from one agency to the other was made gradually, and with only minor changes in the local staff. IBRA assumed full control in January of 1969.

The new line of policy under IBRA was severe. Provisions for marketing, technical assistance, and social services to settlers were maintained as before, and in some cases improved. However, IBRA also announced that no further credit would be available to settlers until the debt of the entire group was paid off, and promptly began collecting a 20 per cent "tax" on the proceeds of every truck-load of produce that left the colony. Settlers who were not prepared to cooperate and to make an extra effort in meeting their obligation were asked to leave.

Since none of the settlers held titles to their land or had ever paid a rent of any kind, many felt that they had more to gain by leaving the colony. By the end of 1969, the number of Brazilian settlers had declined from 34 to 22, while the number of Japanese families declined from 18 to 16. During the next six months, between January and June of 1970, an additional five Japanese families left the project.

With the change-over in the management of the colony, IBRA's austerity program, and a reduction in the number of settlers, a further decline in the total value production was inevitable. The value of sales for 1969 declined to U.S.$59,192 from $95,057 for the previous year.

8.2 Conditions in 1970

While IBRA's "no-credit" policy may have been exceedingly harsh, there is considerable evidence of favourable readjustment and progress. The bitterness found among some of the settlers of Tiriri, because of SUDENE's departure, and because of credit restrictions by the new management, were not evident at Rio Bonito.[5] Both Brazilian and Japanese settlers explained that life in the colony was difficult, but they seemed to be in general rapport with the new management. Several settlers in both groups expressed satisfaction over the fact that they had already paid off a part or all of their debt. They seemed to have found a challenge in sorting out their own affairs. They were also learning that assistance from the government was not something to be taken for granted, to depend upon, but rather something to be earned and intended to pave the road for their own economic progress and eventual independence as farmers. All of this is testimony to the kind of orientation provided by IBRA, and to the development of a very sound relationship between the new management and settlers.

Rio Bonito is under the supervision of an agronomist who is located at the regional headquarter of IBRA in Recife (now the National Institute of Colonization and Agrarian Reform, INCRA). At the local level, the settlement is administered by a young agricultural technician

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[5] Though IBRA will not provide credit, settlers are allowed to make their own credit arrangements. In a sample of seven settlers (two Japanese and five Brazilian), two Japanese and one Brazilian were able to obtain credit from other sources.

who is a specialist in farm cooperatives. He spends most of his time in the field and appears to have the support and respect of all the members of the community. Other local staff include a production supervisor, a clerk, a secretary, an accountant, a second agricultural technician who is a crop specialist, a field supervisor, a warehouse foreman, two truck drivers, two tractors operators, a mechanic, a sawmill operator, two labourers, a cook, and nightwatchman. The entire local staff of 18 people are paid by INCRA, which also assumes the burden of all other maintenance costs and administrative expenditures for the colony.

Total expenditures by the Agency for 1969 totalled U.S.$34,885. At the present time, only a small portion of these expenditures are reclaimed from settlers by charging them for tractor rental and the transport of their produce. Plans are in preparation, however, for the distribution of provisional titles, which will allow settlers to commence payment on their property, and will also gradually devolve upon them the burden of administrative expenditures and of the administration of the project.

Considering the limited number of local technical staff at the colony, the level of technical information and assistance available to settlers is impressive. There are horticultural journals in the Japanese language from São Paulo, and similar journals are available in Portuguese. Settlers can obtain up-to-date information on agricultural chemicals, the use of fertilizers, and on irrigation practices. The

Agency maintains a warehouse with fertilizers and chemicals for sale to farmers. Tractors and small rotovators are available for rental on a cost basis. Irrigation pumps, pipes, and overhead sprinklers are on loan to settlers free of charge. They are required to pay only for gasoline, diesel fuel and oil to operate the pumps. Settlers can readily obtain results on soil tests, and diagnostic information on plant diseases.

While the colony has no cooperative, marketing arrangements are very good. Every day during the week, a truck, and often two, will take settlers' produce to the wholesale market (CARE [6]) of Recife. The Japanese settlers, whose production accounts for over 80 per cent of the total sales of the colony, will take turns in making the sales arrangements with various dealers who buy at the market. The production of Brazilian settlers is usually included in the same load. Control of sales is simple and effective. The production supervisor of the Agency keeps a record of every load of produce leaving the colony. Since CARE provides official, daily and weekly market quotations, which are posted at the administrative office of the colony, settlers are well-informed about prevailing market prices. This also enables INCRA to estimate settlers' receipts and to make deductions on each sale which then are credited against the outstanding debts of settlers.

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[6] Central de Abastecimento do Recife, Recife Wholesale Market, opened in 1969.

INCRA does not follow the pernicious practices common in many other colonies, of retaining settlers' proceeds. In fact, the process is reversed. It is the Japanese sales representative who hands over to INCRA twenty per cent of the value of each sale. The remaining eighty per cent are immediately paid out to settlers. If the individual settler has any debts with the agency on such items as the rental of equipment or other services, it is he who is expected to volunteer the payment. While the bulk of all production from the colony is sold at the Recife Wholesale Market, transportation is also provided to the Town of Bonito for sales at the local market or, in the case of passion fruit, which several Brazilian settlers continue to grow, to the local processing plant.

INCRA's efforts are beginning to show positive results. Despite the fact that the total number of settlers in the colony declined from 52 in the beginning of 1969 to 33 by July of the following year (11 Japanese and 22 Brazilians), production and total sales have been increasing. The total value of sales for the period January to June 1969 was equal to U.S.$38.994, while sales for the same period in 1970 were equal to U.S.$45,573 (cf. Table 6).

Social services are adequate. Settlers make contributions to a rural workers insurance fund (FUNRURAL) which covers medical, dental, and hospital expenses. In the event of an emergency or sickness, settlers are guaranteed that a vehicle is available to provide transportation to Bonito.

TABLE 6

PRODUCTION RECORD, RIO BONITO

January 1, 1970 - June 30,1970

MINISTÉRIO DA AGRICULTURA
INSTITUTO BRASILEIRO DE REFORMA AGRÁRIA - IBRA

DEMONSTRATIVO DA PRODUÇÃO DO NÚCLEO DE REFORMA AGRÁRIA RIO BONITO, CONCRETIZADA DURANTE O C A R E TE RECIFE - PE., DURANTE O PERÍODO DE 01 DE JANEIRO A 30 DE JUNHO DE 1970.

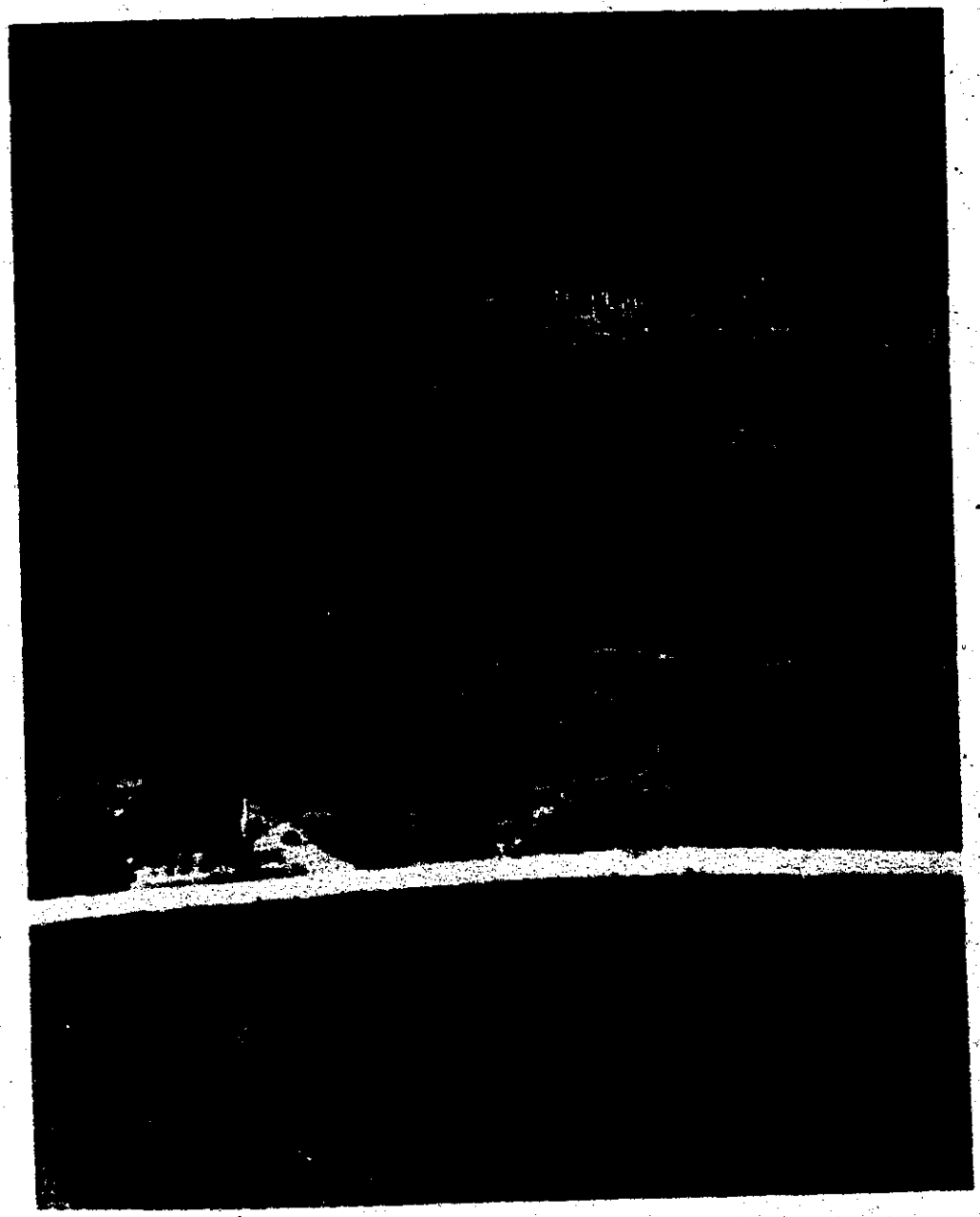
P R O D U T O	QUANTIDADE	UNIDADE	VALOR UNITÁRIO	T O T A L Cr$
Cará Yams	12.680	kgs.	0,40	5.072,00
Laranja Bahia Orange	9.100	frutos	0,05	455,00
Tomate Tomato	140	caixas	15,00	2.100,00
Laranja Pombal Orange	14.000	frutos	0,20	2.800,00
Nabo Turnip	550	kgs.	0,40	220,00
Ervilha Peas	270	kgs.	1,00	270,00
Galinha Chicken	100	unid.	4,00	700,00
Jerimum Squash	2.850	kgs.	0,30	855,00
Goiaba Guava	5.350	frutos	0,20	1.070,00
Banana comum Banana	20.200	frutos	0,02	404,00
Berinjela Egg Pl.	2.810	kgs.	0,50	1.405,00
Feijão Verde Gr. Beans	4.740	kgs.	0,50	2.370,00
Pimentão Gr. Pepper	282.500	frutos	0,03	7.275,00
Couve Flor Caulifl.	3.990	kgs.	0,50	1.595,00
Milho Verde Sw. Corn	48.650	espigas	0,06	2.919,00
Limão Lemon	9.600	frutos	0,05	480,00
Couve Brocoli Brocoli	900	kgs.	1,00	900,00
Batata doce Sw. Pot.	14.590	kgs.	0,20	2.918,00
Melancia Cantaip.	140.764	kgs.	0,20	28.152,80
Abobrinha Pumpkin	5.500	kgs.	0,40	2.200,00
Repolho Cabbage	31.150	kgs.	0,30	9.345,00
Hackeay Hack say	11.690	kgs.	0,50	5.845,00
Melão Melon	85.000	kgs.	0,70	22.600,00
Pepino Cucumb.	31.300	kgs.	0,20	6.260,00
Rabanete Radish	100	kgs.	0,50	50,00
Cenoura Carrot	4.780	caixas	20,00	94.400,00
TOTAL GERAL ...	.....	.....	.....	217.300,80

Exchange Rates: January 1970 U.S.$1.00 = Cr$4.32
June 1970 U.S.$1.00 = Cr$4.55

Primary education is provided at the colony through the Ministry of Education of the State of Pernambuco. All of the five teachers hold normal school certificates. According to the director of the school, a young woman who is a university graduate, attendance for children registered in the four grades is normally 100 per cent. Every effort is made to avoid the "drop-out" of pupils before they have completed at least four years of primary schooling. Transportation is also provided for children attending the Colégio (Grade 4 to 8) in the Town of Bonito, although the director lamented the fact that many children who enjoy school, and who have the ability to go on, cannot do so because their parents cannot afford the monthly fee charged by this private school. Japanese parents insist that their children continue their schooling, while for most of the Brazilian families education is still a luxury which few can afford.

Other educational activities in the settlement include an adult literacy program, a type of 4-H club for boys, and a home-economics club for girls. Despite a very marked social and economic disparity between Brazilian and Japanese settlers, very congenial relations seem to exist between the children of the two groups.

INCRA has not found an effective way to encourage the Brazilian settlers to emulate their more prosperous neighbours. On an average, Japanese settler were found to have gross incomes eight times those of Brazilian settlers, and there are indications that this difference is increasing. Many of the Brazilian settlers have learned to use ferti-



Rio Bonito

Parcel of Native Settler

"A Preference to Work for the Japanese..."

lizer and insecticides, and have learned the practice and advantages of irrigation. However, this is as much a reflection of necessity as it is of the promotional efforts of INDA and INCRA or of their association with the Japanese.

The current situation at Rio Bonito also presents INCRA with a serious dilemma. Every Japanese settler provides year-round employment to at least one Brazilian family (usually women and children). This means that at the present time, roughly half of the family labour force of Brazilian settlers is working for the Japanese. The Brazilian settlers depend upon this additional income, whereas the Japanese cannot do without their help. Unless the productivity, production, and income of the Brazilian settlers can be substantially increased, they are not likely to abandon this present arrangement. On the other hand, if such a change did occur, the Japanese settlers would have to hire workers from outside the colony. Because of the transportation cost involved, such labour would be more expensive. Anticipating such a change, Japanese settlers would react by increasing the salaries of their local workers, thus further delaying the whole process of adjustment.

8.3 Agricultural Practices, Activities and Income

Despite the remoteness of Rio Bonito, and the many inefficiencies and constraints inherent in the agricultural system of the Northeast, the farming practices of the Japanese settlers are scientific and modern.

INCRA has made every effort to provide essential services. Japanese and Brazilian settlers have equal rights and access to important farm inputs, technical information and assistance, and a reliable marketing system. In the case of the first group, these opportunities are taken advantage of to the fullest possible extent. In the case of the second group, however, the benefits of these provisions are not fully realized.

The two principal categories of crops grown by the Japanese are tree crops and vegetables. The only tree crops of importance are guava and several varieties of table oranges. The most important vegetables are carrots, cantaloupe, melons, green peppers, cabbage, cucumbers, and tomatoes, although, as is evident from Table 6, the actual list is much longer. Recently several Japanese settlers have also begun growing potatoes. At the time of the author's second visit to the project, in August of 1970, a truck load of seed potatoes, which had been shipped by airfreight to Recife from São Paulo, was being unloaded at one of the Japanese farms.

Land use on the Japanese farms is very intensive. The area under cultivation for different settlers varies from two hectares to a maximum of six. Those specializing exclusively in vegetable production, rarely have more than 3 hectares of land under cultivation. Settlers with fruit orchards will use the space between young trees to grow vegetable.

All of the Japanese settlers use irrigation. Depending upon the type of crop and on topography, sprinkler irrigation or a gravity system is used. The latter is more common, with ditches following the

Rio Bonito

A Field of Potatoes. Orange Orchard in the Background.

contours of the land, and water being fed into rows from irrigation pipes.

The high cost of fertilizer has not deterred Japanese settlers from using it liberally.[7] Rates of application of 6 to 8 tons per hectare are normal. They also make extensive use of organic fertilizers, as well as manure. One settler growing tomatoes in 1969 applied 8 tons of chemical fertilizer and 40 tons of manure per hectare. His yields set a new record for the colony: 80,500 kg. of tomatoes per hectare. Fungicides and insecticides are also used widely, and are applied with mechanical dusters and sprayers, usually owned by settlers. Many of the Japanese own one or two small garden tractors. Those who do not have their own machines are able to rent them from the Agency.

As already pointed out, all of the Japanese settlers employ workers. One settler, who has four hectares of land in tree fruit and one hectare of vegetable employs ten people throughout the year (half of these are children between the age of 12 and 16).

The production cycle normally begins in August, with the peak harvest season for most vegetable crops falling into the latter part of the dry season (January and February) and extending into the first two months of the rainy season (March and April). This allows settlers to sell their product during the period when prices are highest.

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[7] The transport cost of fertilizer from Recife to the colony is paid by INCRA. In mid-1970, the prices paid by settlers per ton of fertilizer were as follows: Ammonium Sulphate (20%) U.S.$56; Triple Super Phosphate (45%) $94; Potassium Chlorate (62%) $73; Superphosphate (18%) $51; Low Grade Organic Fertilizer (vegetable oil processing residue) $16; Manure $5.

To avoid overproduction, Japanese settlers closely coordinate their planting and harvesting activities. For example, carrots are seeded every month from the beginning of November to the end of February. Tomatoes and potatoes are planted in August, September, and October. A similar planting pattern is followed for most other crops grown under irrigation. Unlike the practice common throughout most of the region, very few crops are planted at the beginning of the rainy season.[8]

The yields and gross returns per hectare obtained by the Japanese settler are impressive. The following data were obtained from the records of several Japanese growers. Calculations of gross returns per hectare are based upon average prices received by settlers during the first six months of 1970.

Product	Yield per Hectare	Price per unit U.S.$ equiv.	Gross Returns per Hectare U.S.$ equiv.
Carrots	19,200 kg	0.18 kg	3,456
Tomatoes	65,000 kg	0.14 kg	9,100
Cantaloupe	24,000 kg	0.04 kg	960
Potatoes	24,500 kg	0.11 kg	2,695
Oranges	21,000 fruit	0.04 fruit	840

[8] Earlier attempts to grow vegetables during the rainy season were frustrated by mildew and other crop diseases. The traditional crops of the region, i.e. yams, manioc, corn, etc. seem to be little affected by these problems, and, unless irrigation is possible, are planted at the beginning and during the wet season.

The following accounts were volunteered by two Japanese settlers, and provide some indication of their land use, expenditures, and incomes. Their records are kept on a calendar year basis. The figures cited here are for 1969.

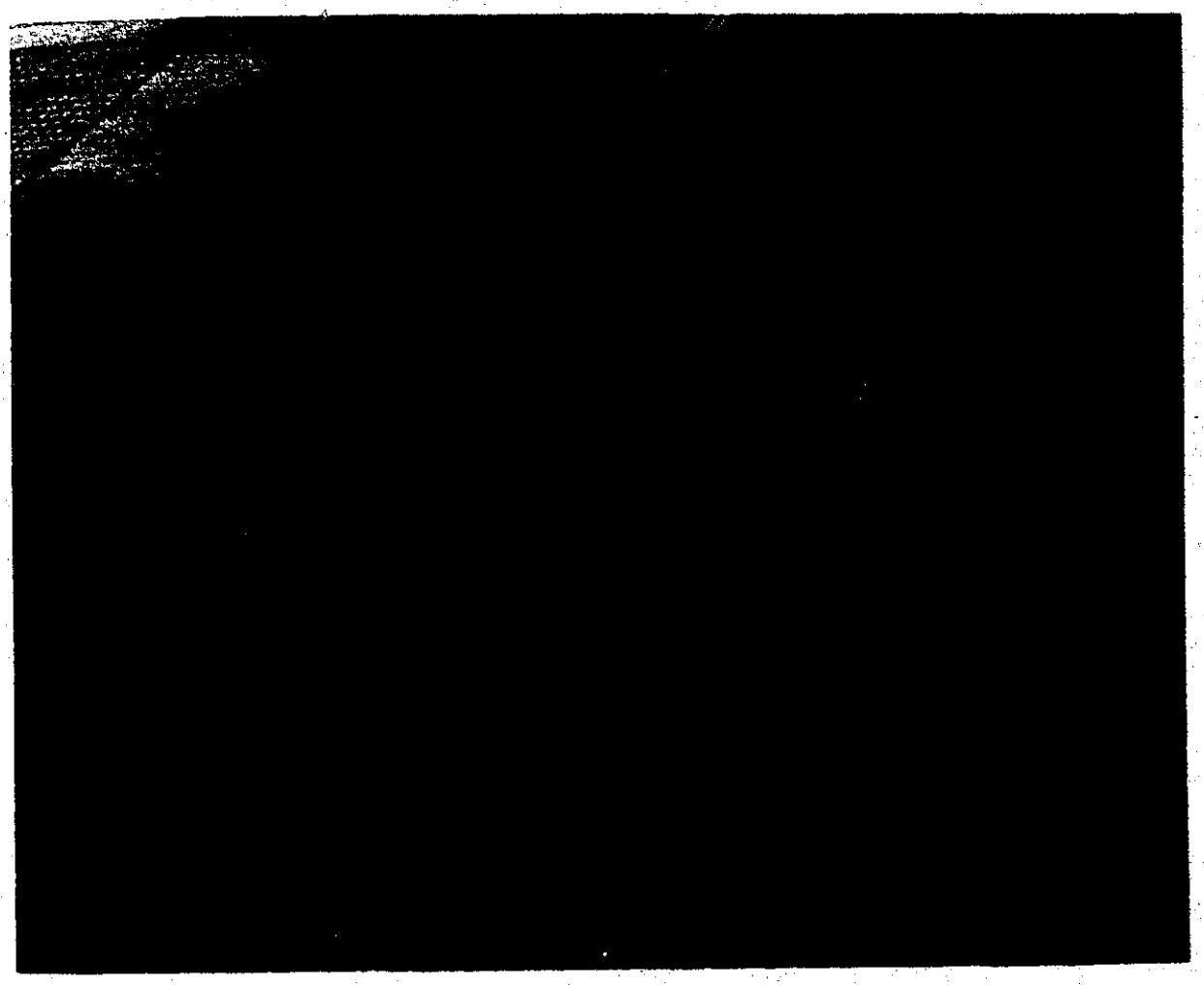
1. Vegetable Enterprise

a. Gross Income

Product	Area Planted Hectares	Gross Revenue U.S.$equiv.
Carrots	1.3 ha	4,335
Tomatoes	0.5 ha	5,635
Cantaloupe	1.0 ha	960
Total	2.8 ha	10,930

b. Expenditures

	U.S.$
Insecticides, Fungicides	930
Fertilizer : 14 tons ($58/ton)	812
Manure : 75 tons ($5/ton)	375
Total paid labour	1,412
Misc.Expenses (boxes, gasoline, oil, transport, depreciation, etc.)	890
Total Expenditures	$4,419



Rio Bonito

Two Japanese Vegetable Farms

c. Net Income and Returns to Labour

	U.S.$
Gross Income	$10,930
Total Expenses	4,419
Net Income	6,511

Family Labour: Two adults working full-time and two children working part-time; estimated total of 680 man/days

Returns to Family Labour $\frac{6,511}{680}$ = U.S.$9.57 per man/day

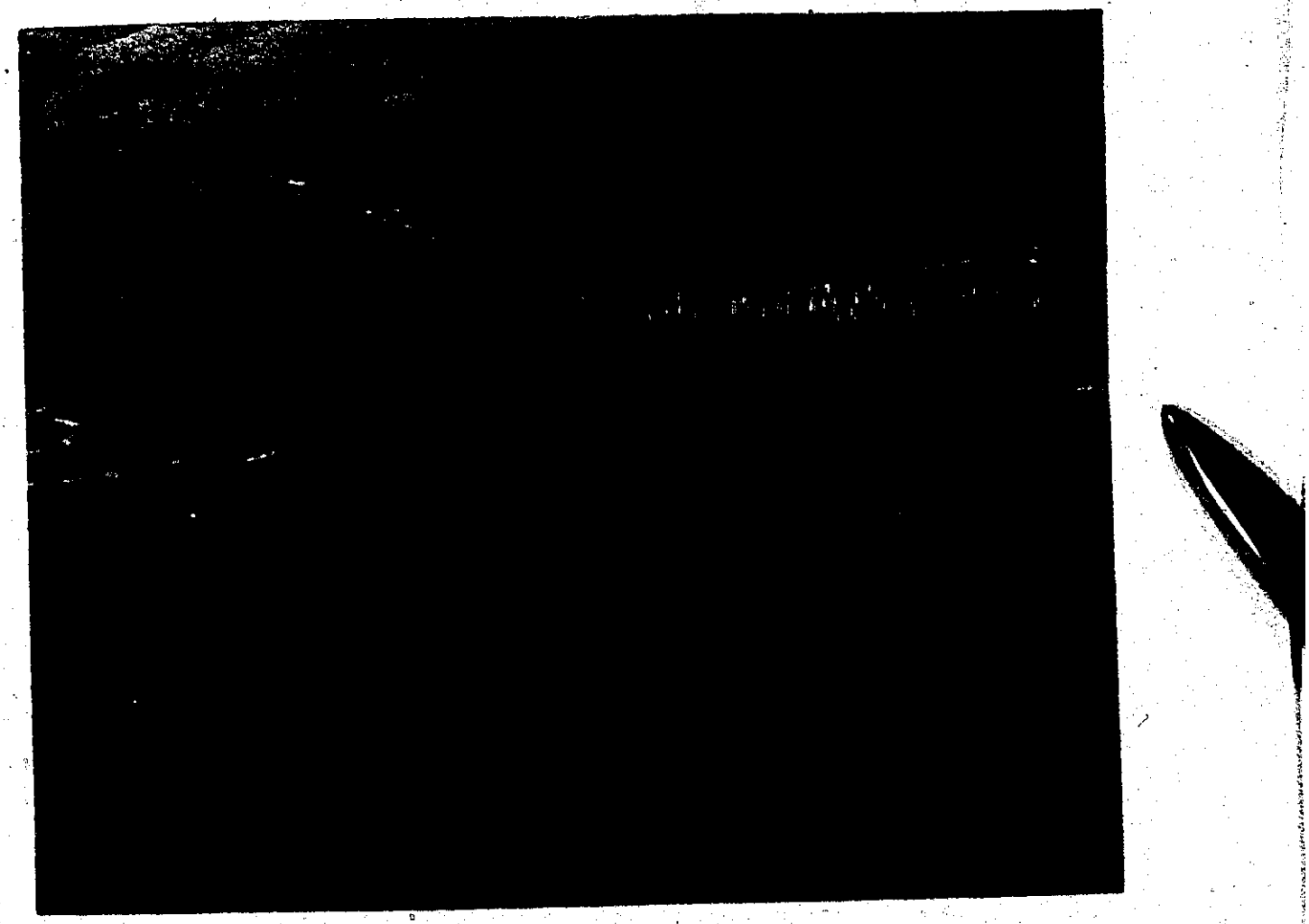
2. Fruit and Vegetable Enterprise

a. Gross Income

Product	Area Planted Hectares	Gross Revenue U.S.$equiv.
Oranges	2.5 (not in full production)	1,730
Guava	1.5 (not in full production)	492
Lemon	1.0 (not in full production)	76
Vegetables	1.0 (interplanted)	2,934
Total	5.0	$5,232

b. Expenditures

	U.S.$
Insecticides, Fungicides	510
Fertilizer, Manure	690
Total paid labour	2,011
Misc. Expenses	497
Total Expenditures	$3,708



Rio Bonito

Orange Orchards interplanted with Vegetable

c. Net Income and Returns to Labour

	U.S.$
Gross Income	$5,232
Total Expenses	3,708
Net Income	1,524

Family Labour : Two adults working full-time
Estimated total of 620 man/days

Returns to Family Labour $\frac{1,524}{620}$ = U.S.$2.45 per man/day

The level of gross income of the two operations for which production data are cited is above the average gross income of the Japanese group. However, as was pointed out earlier, five additional families left the colony during 1969, making an accurate estimate difficult. Production was also affected by the change in administration and by related problems. The average gross income for the 12 months period of 1969 of 16 Japanese settlers is estimated at U.S.$2,959. The average gross income for only 11 farms during the first six months of 1970 had already increased to U.S.$3,314, and according to IBRA's production estimate was to come close to $5,000 for the entire year.

The income for the vegetable enterprise reflects fairly accurately the potential for similar type operations, with variations only due to the types of vegetable grown and the area in production. In the case of the fruit and vegetable enterprise, the 1969 gross income can be expected to increase by 50 to 80 per cent once the orchards come into full production. Returns to labour should more than double because

Rio Bonito

Up to Date in Technology

Local Worker spraying Orchard of Japanese Settler

Rio Bonito

Japanese Settler and Stevenson Screen

"Nothing is left to chance, and nothing taken for granted"

past and present investments on immature orchards are only just beginning to pay off.

The income position of Brazilian settlers differs markedly from that of the Japanese group, although, in terms of agricultural practices, they generally are more advanced than settlers in most other colonies. Of a total of five Brazilian settlers interviewed, all five use insecticides regularly, four use chemical fertilizers, two practice irrigation, and all five use tractors rented by the Agency.

The area of land under cultivation ranges from 2.0 to 7.5 hectares. All five settlers have from 0.3 to 2.5 hectares of manioc, and from 0.5 to 2.0 hectares of passion fruit. Other crops grown include sweet potatoes, yams, corn, and bananas. Annual gross incomes for 1969 for the group ranged from U.S.$340 for an operation with 2 hectares in crops (1.0 ha passion fruit, 0.5 ha sweet potatoes, 0.2 ha bananas, 0.3 ha manioc) to a maximum of $767 for an operation with 7.5 hectares in crops (2.0 ha passion, 2.0 ha manioc, 2.0 ha corn, 0.5 ha sweet potatoes, 0.3 yams, 0.2 bananas, 0.5 other crops). The average 1969 gross income for the sample group was $480, which roughly corresponds with the records of the Agency, showing total sales of U.S.$10,274 for 22 Brazilian settlers or $467 per family.

Considering that the average area of land in crops by Brazilian settlers is 3.7 hectares, average gross incomes are low, and returns per hectare are only U.S.$146. Again, it should be kept in mind that a substantial portion of the production of such crops as manioc, yams, and

bananas is consumed by the family. Also, the crops that are produced by the Brazilian settlers, while demanding a great deal of labour, are generally low value crops. Passion fruit is no exception. One hectare of passion fruit requires 150 man/days of labour per year. Average yields at Rio Bonito are four tons per hectare, with a price of $45 per ton or an average gross returns of $180 per hectare. If expenses for fertilizer, pesticides, wire and posts for trellises, and the initial cost of establishing the planting are considered, returns to labour are between $0.80 and $1.00 per man/day. The only advantage of passion fruit is that it provides a small cash income on a year 'round basis, and that the collection of the fruit can be done by children and women. Fruits will mature every month of the year. The fruit are allowed to fall to the ground and are collected once a week, or more often if necessary.

Unlike the production cycle adopted by the Japanese, which falls largely into the dry season, the Brazilian settlers follow the traditional pattern of planting at the beginning of the rainy season. The only exception are two settlers who, in addition to their regular crops, grow sweet potatoes and corn (corn on the cob), using some irrigation, which permits the production cycle to extend from the latter part of the wet season into the first two months of the dry season.

While the Brazilian settlers at Bonito benefit from the services provided by INCRA, and are using some modern farm inputs, their income position does not differ significantly from Brazilian settlers

in other projects. Because of the impoverished soil conditions, production costs per unit of output at Bonito are higher than in areas with more fertile and less permeable soils. If it were not for the organization and services provided by INCRA, Brazilian settlers would not be able to produce much beyond the needs for their own subsistence. Through the continued promotional effort by INCRA, the adoption by settlers of more profitable crops, and longer-term investments in fruit crops, a gradual improvement in the income and capital position of the Brazilian settlers will be possible.

8.4 Conclusion

Considering the marginal capability of the land and its remoteness, the decision to establish a colonization project at Rio Bonito was to invite almost certain failure. That such failure did not follow can only be ascribed to the fortuitous circumstance of a regulation in force until 1964 that federal colonization projects must contain a certain proportion of foreign settlers. Had the project only contained Brazilian families, the investments of INIC and subsequently of INDA and of INCRA would have been difficult to justify.

By sheer good fortune and the experimentation of the Japanese settlers, it was found that the area, by virtue of its altitude and cooler climate, was extremely well-suited for the production of certain vegetable crops, particularly carrots and potatoes, which cannot be grown under conditions of higher temperature and humidity.

Specializing in high value cash crops, Japanese settlers have been able to effectively counter the constraints of low fertility and limited soil moisture. The same constraints, however, seriously limit the income potential of the Brazilian settler who has not yet learned the art of specialized crop production but who must use the same costly inputs if he hopes to rise above a minimum level of subsistence.

During its short period of administration, INCRA has provided credible and commendable management for the project. The Agency's departure from traditional, paternalistic attitudes is particularly noteworthy. While there are no immediate and easy solutions for reducing the considerable social and economic disparity between Brazilian and Japanese settlers, the prospects for the continued growth and development of Rio Bonito, and for its eventual independence are very favourable.

PROJECT SUMMARY

RIO BONITO

AGENCY: National Institute of Colonization and Agrarian Reform (INCRA)

LOCATION: Municipality of Bonito, 130km west of Recife

DATE ESTABLISHED: 1955 by the National Institute of Immigration and Colonization (INIC)

COST ESTIMATE: No data

FUNDING: Bank of the Northeast, State Development Bank, Federal Funds through INCRA

TYPE OF SETTLEMENT:

Composition of Settlers 1970: 22 Brazilians, 11 Japanese

Size: 1,379 hectares Number of Lots: 52

Layout: houses dispersed Lot Size: 32 lots of 25 hectares
20 lots of 12.5 hectares

Tenure: not decided, eventual distribution of titles.

PHYSIOGRAPHY:

Mean Annual Rainfall: 568mm + Mean Annual Temp. : 19°C

Wet Season: March to August Dry Season: Sept. to Feb.

Topography: Gentle undulating, slopes generally less than 10 per cent, except for steep valley sides

Soils: Sands, containing reddish clays in the B horizon

ECONOMIC DATA:

Principal Crops: Vegetable, Citrus, Guava, Passion Fruit, Manioc, Yams, Bananas

Livestock: Poorly developed, a few cattle, some poultry

Services: Marketing of all crops, technical assistance, mechanical equipment, farm inputs

Settler Incomes: Average Annual Gross Income
Brazilian: U.S.$467 Japanese: U.S.$3,314
Entire Sample: U.S.$1,077 Range $246 to $5,000

Estimated Average Value of Production per ha of land under cultivation: Brazilian $146, Japanese $1,100

Estimated Average Returns to Labour per man/day: Brazilian: U.S.$1.10, Japanese: $4.50

SOCIAL DATA:

Av. Fam. Size: Braz. 5.3; Jap. 5.1 Av. Age: Braz. 40.6; Jap. 43.9

Services: Primary Education, Transport to Highschool, Health Insurance Plan, Adult Education, Youth Clubs

Total Number of Families: 33 (1970), to be increased to 52

IX

THE COLONY AND COOPERATIVE OF PINDORAMA

9.1 History and Development

The Colony of Pindorama is the largest privately sponsored land settlement project in Northeast Brazil. It is sometimes referred to as a "show case" for colonization, although many remarks that have been made about the project are less complimentary.

The colony was established in 1954 by the then newly-created Companhia Progresso Rural (CPR). The CPR was a private firm which was to work in close collaboration with the National Council of Immigration and Colonization (INIC), and was to establish and develop colonies in different parts of Brazil. Progresso Rural, which had been supported by federal funds, after only two years of operation encountered serious financial difficulties, and by the end of 1958 declared its intention to abandon its colonization activities. By that time, two large projects had been partially implemented. One of these was the Colony of Pindorama.

Pindorama occupies some 34,000 hectares of hilly coastal lands in the State of Alagoas, between the Town of Penedo, on the Rio São Francisco, and the Town of Coruripe, 55 kilometers further to the north (Fig. 16). A rough gravel road from Penedo runs through the center of the Colony and at the Town of Junqueiro, some twelve kilometers beyond the northwestern boundary of the project, connects with paved federal highway BR-101, from where it is some ninety kilometers to Maceio, the capital of the state.

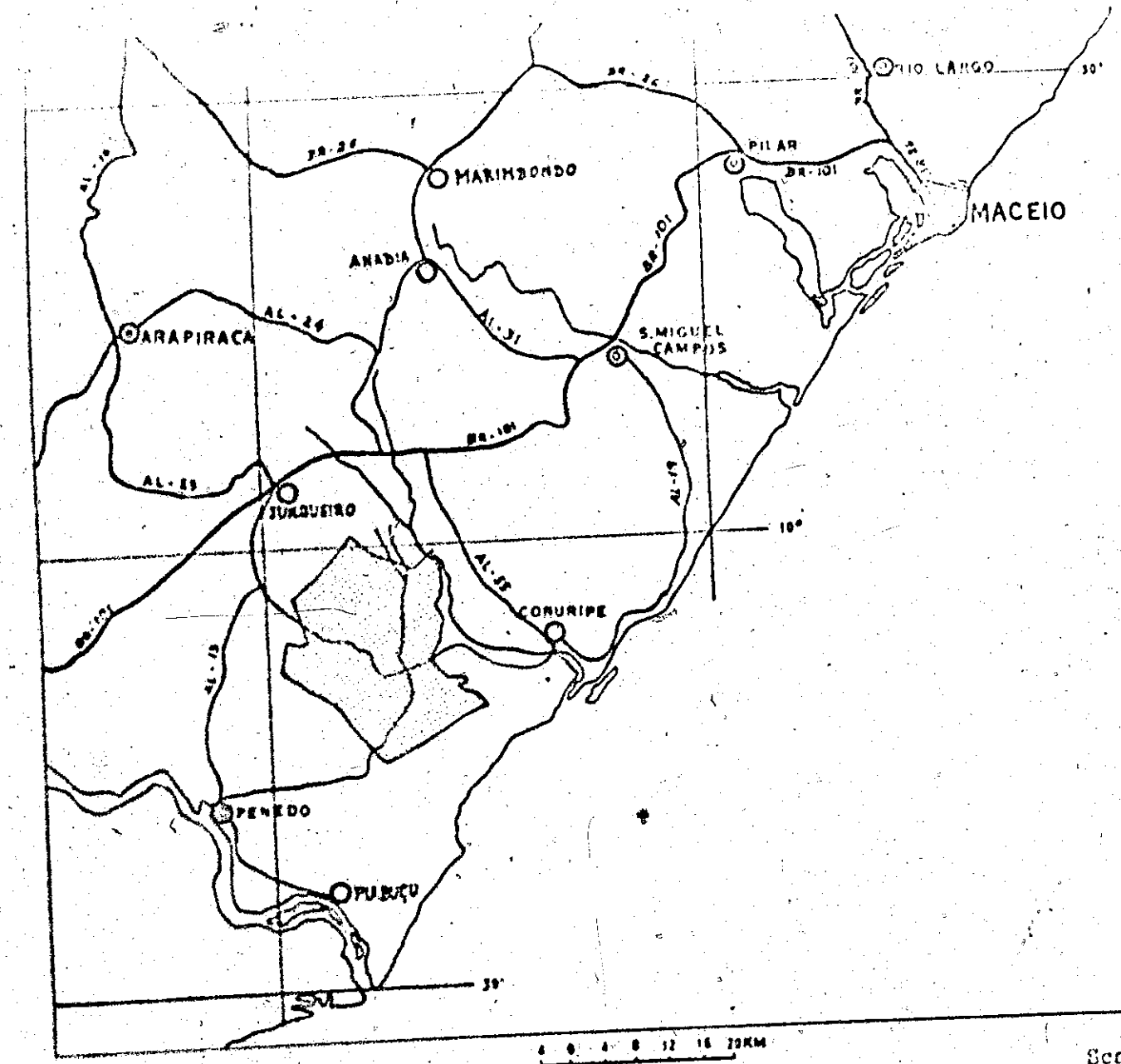


Figure 16

LOCATION MAP

COLONY PINDORAMA

LEGEND

Capital
Cities over 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to 10.000
Federal Highway BR
State Highway AL

Area of Colony

Scale 1:800,000

The area is made up largely of flat-topped and partially dissected highlands belonging to the so-called Barreiras series, which are formed by sands, sandstones and layers of clay. From the ocean inland as far as Penedo, and including some of the eastern part of the colony, are extensive areas of recent alluvial sediment, originating in the estuary of the São Francisco River. The highest elevation within the colony is 100 meters above sea level. Maximum local relief is 70 meters. Principal soil categories include extensive tracts of poorly drained, but fertile valley soils, which eventually are to be exploited for rice production; barreiras soils which are sandy clays, covered in their natural state with a fairly thick layer of humus and which are predominant on the slopes and also extend over portions of the upland, and tabuleiro soils which, for the most part, are sandy, uneroded residues of gneiss and related parent rock. Most of the soils are deficient in basic minerals, and without corrective measures are depleted after three to four years of intensive cropping.

Average annual precipitation for the area is 1,344 mm, with an annual mean temperature of 24.4°C. The rainfall regime is similar to that described for Cabo, with precipitation above 100 mm from March until August, and from 25 to 65 mm for the period between September and February.

The physical layout of the colony is shown in Figure 17. Only about 10,000 hectares of the total area of 34,000 hectares is effectively occupied. This area is divided into nine sub-units or

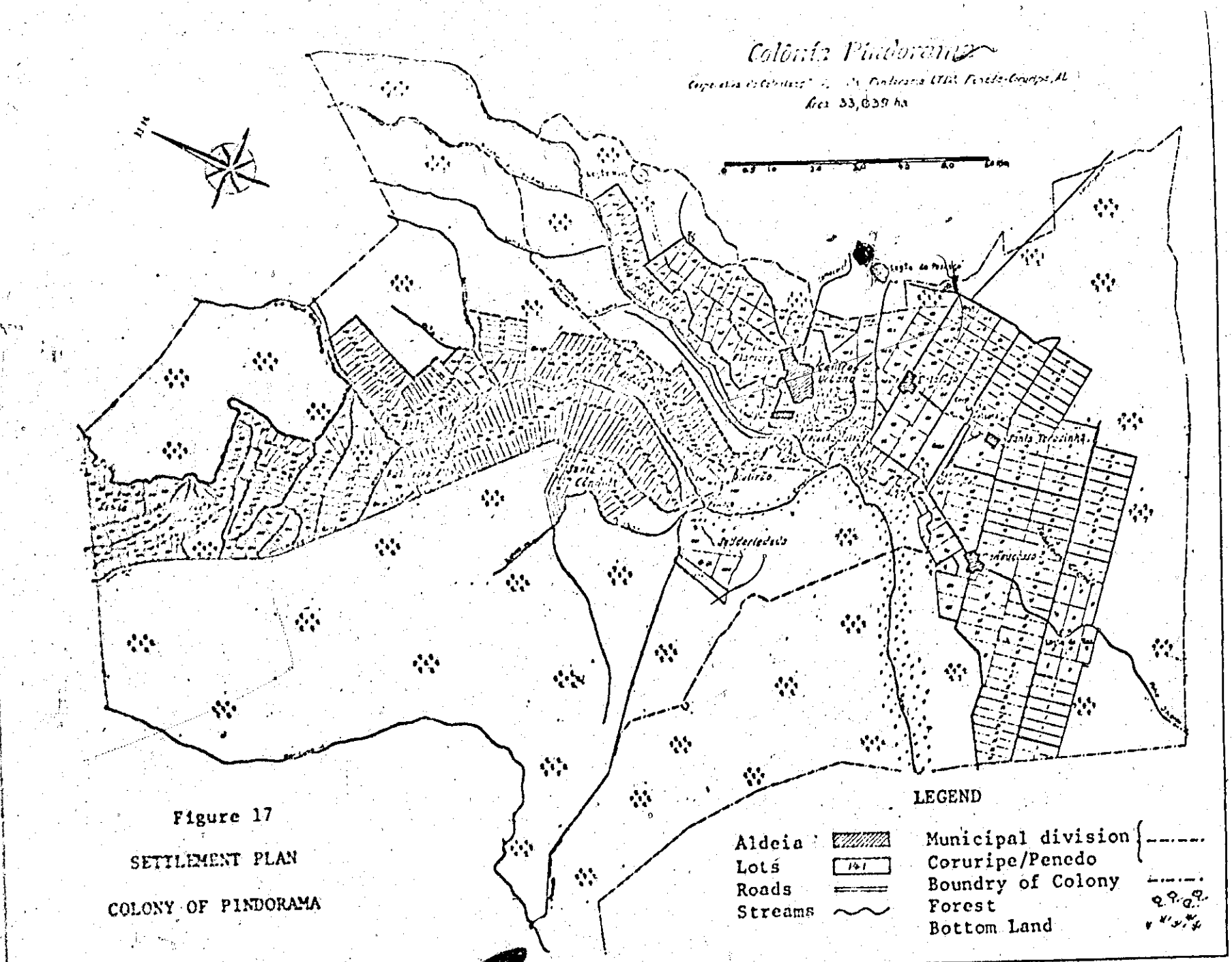


Figure 17

SETTLEMENT PLAN

COLONY OF PINDORAMA

aldeias of varying size and an urban center (centro urbano). The urban center contains the main administrative offices, an agricultural training center, a large school building for primary education, a processing and bottling plant for passion fruit juice, a ceramic and brick factory, a sawmill and carpentry shop, a rice mill, a small animal feed processing plant, an abattoir, a shop for mechanical repairs, a gasoline station, a cooperative store, a pharmacy, a small hospital, and a number of other installations and buildings. In addition, there are some 120 houses for administrative personnel, teachers, salaried workers, and 26 settlers who live in the center, but whose lots are located around the periphery of the village.

The urban center used to have its own generating station, but, since 1962, is being supplied by electricity from Paulo Afonso. Most of the buildings and residences of the village have electricity and are supplied with running water. Water is obtained from tube wells. All offices, and other important buildings in the center have telephone connections.

The aldeias are of two types: the nucleated settlement with lots surrounding each vila and the dispersed settlement with each family living on its designated parcel. There are four aldeias with houses nucleated into vilas and five aldeias with dispersed housing. The decision to establish either one or the other of the two systems of settlement in any given sub-region was largely dictated by topography. The southern portion of the colony, which has three of the nucleated aldeias,

consists of a level or nearly level upland which facilitated the construction of roads at regular intervals, the division of the land into rectangular lots, and the more or less central location of each vila. Similar site characteristics apply to the area occupied by the Aldeia Flamengo, adjoining the urban center, except that the land is at a lower elevation. The remaining aldeias are characterized by lots strung out along important water courses, with roads running parallel to the streams, and individual lots extending from the road upward along the valley slopes.

The vilas normally contain a public school, residences for two or three teachers, a first aid center, and a cooperative store. All have a water reservoir fed by a tube well, and recently underground piping was installed to provide settlers' houses with running water. Houses are fairly spacious, all have tile roofs and cement floor, and are either of brick construction or the mud and pole type (casa de taipa)[1]. They are built on lots of 30 by 150 meters (0.45 hectares), which allows each family to grow a few subsistence crops and vegetable, and to keep a few chicken or goats. Most of these lots are partially or completely surrounded by a fence. Some contain a second house occupied by a morador family working for the settler. Farm lots vary in size from 15 to 25 hectares and make up the major area of each settlement unit or

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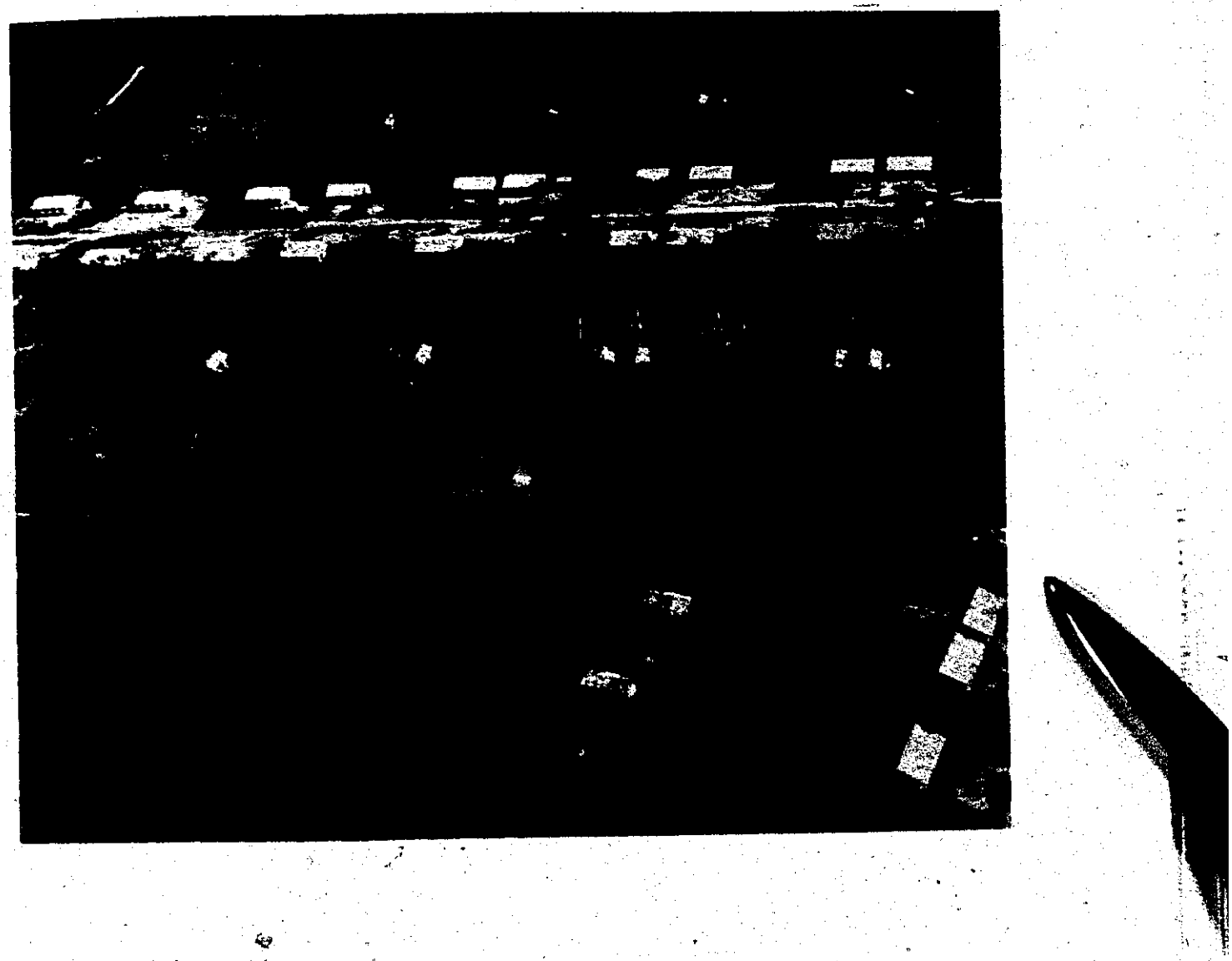
[1] The plan is the same for all houses, however, only 200 houses that were built by the Companhia Progresso Rural, are of brick construction. In an effort to reduce costs, houses built from 1959 onward used cheaper materials leaving any later improvements to the individual settler.

Administrative Center of Pindorama



Nucleated Settlement - Aldeia

Pindorama

aldeia. The distance from the vila to the farm lots varies from a few hundred meters to a maximum of five kilometers.

The remaining five aldeias, with dispersed housing, have lots of similar size, although a few lots are only 10 hectares in size. Parcels generally are very long and narrow, less regular in shape, and with somewhat greater variations in size. Most of the houses are casas de taipa, with tile roofs. Cement floors are less common. Water normally is obtained from shallow wells. Centrally located in each aldeia are a school, a cooperative store, and a medical or first aid center.

In 1970, Pindorama had 420 regular settlers who occupied a total of 10,000 hectares of land. The same area, also supports some 186 moradores who work for the settlers. A morador normally is given a small piece of land on the settler's property on which he can build his house and grow a few subsistence crops. He does not pay any rent and is entitled to receive the legal daily minimum wage for his labour. Most of his time is spent working for his "landlord", although often he works for more than one settler.

The remaining 24,000 hectares of land of the project include some 430 kilometers of roads, 60 hectares which are occupied by the urban center and its installations, 2,500 hectares of dense forest, 500 hectares of native pastures, 18,000 hectares of tabuleiro land and slopes covered with degraded forest and capoeira, and 2,000 hectares of valley bottoms and marshes. An estimated 4,000 hectares of the total

area are considered unsuitable for cultivation. Plans exist for the improvement of the valley bottoms for the production of paddy rice, and the opening up of other areas within the colony for future settlement. It is estimated that an additional 1,000 families can be settled once these improvements have been completed.

The history and development of Pindorama has been characterized by near financial disaster in the beginning, excessive levels of assistance from foreign sources, political entanglements and interference, and chronic administrative problems.

Basic surveys for the colony were completed by the end of 1954, and, by the beginning of the following year, the Companhia Progresso Rural commenced with the physical implementation. By the end of 1957, the CPR had completed the construction of 200 permanent dwellings, of 150 kilometers of new roads, and of all installations in the urban center; a fruit juice processing plant and an agricultural training center were built at a later date. The Company had also completed the selection of the first 190 settlers, of which 100 received land, while the other 90 were selected to provide the permanent salaried labour force for the various activities associated with the development and management of the project.

By the beginning of 1958, CPR had exhausted its own and federal funds which had been allocated for the project. Disagreement with federal authorities over the further financing of the colony led to a cessation of all activities and, after a prolonged period of unsuccess-

ful negotiations, to CPR's disclaim of all further responsibility.

Hoping to rescue the situation and to prevent the complete abandonment of Pindorama, René Bertholet, the Swiss-Brazilian technical director of the CPR, and a onetime labour organizer, resigned from the Company and intervened on behalf of the families living in the project, to organize them into an agricultural cooperative. The federal government agreed to the proposal, and in March 1959 the Cooperativa Agrícola Pindorama Ltda. came into existence.

Bertholet became the cooperative's first director. For the next 27 months, the future of the cooperative and colony seemed uncertain. The previous conflicts between Progresso Rural and federal authorities had remained unsolved and the cooperative, besides being unable to secure any funds, also found itself in the midst of endless legislative and bureaucratic battles between the CPR and the government. SUDENE, which was established during this time, made a study of Pindorama, and concluded that the colony and cooperative was a vital pioneering effort in agrarian reform, and worthy of maximum support. However, no official support was forthcoming. In the meantime, Bertholet travelled around the country, securing private loans, talking to government officials, luring technicians to help with the work, and generally promoting the enterprise. He also obtained promises of support from the governments of Switzerland and Germany. However, such assistance, even if it was offered in the form of outright grants, could not be accepted without ratification by various federal ministries, which needed more than a year to ponder the pros and cons of the matter.

Finally, in August of 1961, after 27 months of seemingly futile dialogue, the importunity and relentless effort of the cooperative's director was beginning to show results. The federal government authorized a loan equal, at that time, to U.S.$98,000. The construction of an unfinished fruit juice processing plant was completed, and by the end of the same year, the colony showed its first substantial revenue, - over U.S.$40,000 from the sale of bottled passion fruit juice sent to the State of Guanabara. Despite the cooperative's precarious financial position, new families were continuously accepted into the colony, and by the end of 1961, all 420 lots were occupied.

The following year, the Swiss Government provided a long-term loan of U.S.$140,000 to establish a revolving fund, to provide operating capital to settlers, and to further develop the industrial infrastructure of the project. At the same time, representatives of West Germany's foreign assistance organization GAE (Gesellschaft fuer Agrarische Entwicklung) and of the Friedrich Ebert Foundation, were undertaking studies and considering possible avenues of assistance. Under the Alliance for Progress, food was being contributed, and eight U.S. Peace Corps volunteers made Pindorama their home for the next two years.

From 1962 onwards, the project was deluged with a flood of foreign financial and technical assistance, which probably has few parallels in recent development history.

Between 1962 and 1965, West Germany and Switzerland, provided [illegible], capital and equipment grants equal to U.S.$1.2 million. From 1964 to 1966, 18 Dutch Peace Corps volunteers worked with the cooperative.

The team included agronomists, mechanics, electricians, carpenters, and other craftsmen, several social workers, four nurses, a nutricionist, and a medical lab technician. This group was relieved in 1966 by a team of 15 equally qualified volunteers from West Germany. From 1966 onwards, Germany provided a ten-man technical team which included a plant pathologist, an agricultural engineer, a tropical crop specialist, a rural extension worker, a cooperative specialist, an economist, a veterinarian, a forestry specialist, and a specialist in business administration. In 1970, this team was reduced to a staff of seven, and is to continue its assignment to Pindorama until 1972. The same organization (GAE) also established an experimental station, provided modern processing and bottling machinery for the juice plant, donated 330 tons of fertilizer and 10,200 kilograms of insecticides, and an elaborate inventory of hand tools, sprayers, pumps, and other small equipment, as well as a fleet of Unimog trucks, several tractors, and other machinery[2]. From 1968 onward, four German technical corps volunteers (a type of Peace Corps) have continued to provide assistance to the cooperative. Under the Friedrich Ebert Stiftung, several public health and education specialists have recently come to Pindorama, and are engaged in the training of local personnel. In 1968, the

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[2] Fertilizer was sold to settlers to establish a fund to purchase other fertilizer. Vehicles and other machinery were also provided as outright gift, but under the condition that the cooperative establish a "depreciation fund" with which the equipment is to be replaced after a certain period of time.

GAE and a syndicate of German relief organizations provided the funds for the construction and furnishing of a large agricultural and vocational training center.

Apart from substantial donations of food stuff under the Food for Development Program of the Alliance for Progress, the U.S. Agency for International Development, in 1966 provided the cooperative with a development grant equal to U.S.$45,500, to establish a revolving fund of production credit to farmers, and to finance and further develop its passion fruit industry.

Other assistance to the Colony included the services of a labour expert from the I.L.O. of the United Nations, donations of funds by a private group from Switzerland, gifts of money by a German labour union, and contributions of various capital goods by the Dutch Government.

In more concrete terms, over the eight year period between 1962 and 1970, Pindorama received the equivalent of approximately 140 man/years of technical assistance in the form of yaribus specialists and skilled volunteer workers. The total value of all contributions from the foreign sources during this time, in grants, technical assistance, and capital goods, but excluding any loans which need to be repaid, is estimated at close to U.S.$5 million[3]. This represents close to U.S.$12,000 for each of the 420 official settlers of the project.

While this plethora of aid and good intentions helped to guarantee the survival of the colony during its early critical years, it

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[3] Included in this estimate is the cost of paid technicians and volunteer workers provided by the U.S., Germany, and Holland.

also created many problems.

Almost from the beginning, Bertholet's success at Pindorama invoked the anger and intense displeasure of local land baron and state senator Louis Coutinho. Fearing that land reform at Pindorama was setting a dangerous precedent, and that the new settlers might threaten his political power, he raised the cry of "foreign spoliation". Receiving support from Switzerland, West Germany, and the United States, Pindorama was an easy target. Bertholet himself became the object of the most severe criticism. Many settlers, whose life in the colony had been nothing but struggle, began to believe rumours that they had been made the dumb victims of a plot to exploit them. Angered by this anti-foreigner campaign, in May of 1963, Bertholet resigned as president of the cooperative. In the meetings which followed, members of the cooperative elected one of their own men, João Simplicio as president, but cautiously retained Bertholet, whom they appointed as superintendent.

The new arrangement seemed satisfactory for a while. But before long, settlers began to criticize their new president, and some accused him of stealing from cooperative funds. Annoyed with the endless bickering, the representative of the Swiss relief agency left Pindorama in November of 1963, and the European technicians also talked of leaving. Everything seemed to be going as Coutinho had hoped. As a final coup, he accused Bertholet of having stolen $60,000 from the colony, and on December 27 called his men to a general meeting to get rid of the foreigners.

In desperation, Bertholet appealed to Alagoas State Governor Luis Cavalcante, a political opponent of Coutinho. Cavalcante went to

Pindorama for an inspection of the situation and a series of conferences. Before the year ended, he replaced co-op president Simplicio by a state interventor, who in turn confirmed Bertholet's position as superintendent. Conditions gradually returned to normal. However, the seeds of mistrust had been sown, and have continued to affect relationships between settlers and the people appointed to manage their affairs.

A year after the intervention, the cooperative was again allowed to elect its own president and board of directors. It was Bertholet, however, who attempted to manage and maintain control over the growing and increasingly complex agro-industrial enterprise. Until his death, in the beginning of 1969, he made eighty per cent of all decisions concerning economic, social, and administrative issues of the colony and cooperative[4].

The reasons for Bertholet's authoritarian rule were as obvious as they were unfortunate. With assistance pouring into the project from all directions, the industrial complex expanded, production increased, and the total personnel on the payroll of the cooperative increased to over 200 people. Those holding elected positions were settlers. Most of them had little or no formal schooling and were totally unprepared for the responsibilities entrusted to them. With very few exceptions, those who were hired for clerical, supervisory, and other duties, were also people

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[4] Moab A. Silva, Relatório Parcial da Situação Sócio-Economica da Cooperativa de Colonização Agrícola Pindorama Ltda. CODEAL, Companhia de Desenvolvimento de Alagoas, Maceio, Aug. 1969, pg. 18.

from within the colony, and were equally unprepared. While the policy to provide employment and in-service training to the colony's own people, under different circumstances, would have been highly commendable, it was an expensive luxury which the cooperative could sorely afford. Those in positions of authority were jealously guarding their place and were unwilling to pass on to others what they had learned. Secretiveness and mistrust further complicated the development of effective working relationships between different members of the team. On the other hand, those who could provide training and counsel, and who attempted to do so, were foreigners, individuals that were here today and gone tomorrow. They were considered friends for whatever temporary favours they could bestow, but they were unlikely patrons to seek out for any permanent sort of relationship and dependence. The skills they were so eager to impart were not regarded as priorities. In the mind of most of the local people, improvement in one's status still seemed to depend largely upon favours and good fortune and the will of God.

Because of the very limited level of administrative capability, the cooperative went from one crisis to the next. There were many serious losses. In 1968, settlers produced a total of 2.7 million kilos of passion fruit. Over two thirds of this production was lost because there were not enough bottles. The following year, a stock of 720,000 bottles of juice had to be carried over because not enough thought had been given to the organization of sales. To remedy the situation, the CAF team launched a promotion campaign throughout Central and Southern Brazil, with the result

that, by the early part of 1970, demand was far exceeding the quantity the cooperative could supply.

There are still many serious inefficiencies in the various industrial and business enterprises of the colony. There is no system of production or stock control, or of cost accounting. Much seems to be done by trial and error. The ceramic and brick factory is turning out more building materials than is used in the colony and an external market has not been developed. By the end of 1968, the consumer section of the cooperative had accumulated a stock of food items valued at U.S.$87,000, when a much smaller stock would have been adequate had the purchasing system been properly organized. On the other hand, in the same year, the cooperative paid U.S.$28,700 in bank interests on outstanding loans.

Every year Pindorama pays over $50,000 in state taxes and contributions to the federal social insurance, INPS, and the social insurance for rural workers, FUNRURAL, yet the colony pays for its own schools and teachers, maintains its own health posts and is not granted reimbursement for any of these expenses.

No official information could be obtained about the failure rate among the original group of settlers, or about the procedures adopted for their selection. The policy established by the cooperative after 1959, was to accept a prospective settler for a six months to one year trial period. If his adjustment was favourable, he was to be admitted as a member of the cooperative, and was to receive a contract to pay off his lot. The property was to be paid off over a maximum period of 15 years.

This system could not be followed. The cooperative functions as though it owns the land. However, many of the legal problems dating back to Progresso Rural are still unresolved. Only two out of 42 settlers interviewed claimed that they paid for their land and are proper owners. Although none have received any titles, the other forty have not made any payments on their property and were never asked to do so. Settlers do not pay any rent or tax. One of the directors of the cooperative explained that settlers cannot be given contracts until the legal questions are resolved.

From interview data, it appears that Pindorama filled its lots by the same costly trial and error method typical of other projects, and experienced equally high failure rates. As pointed out earlier, all 420 lots in the colony were occupied by the end of 1961. Of 42 settlers interviewed, 17 settlers or little over 40 per cent came to the colony after 1961. Of these 17 families, 10 came to Pindorama over the last four years. There has not been an increase in the number of lots, hence an estimated 40 per cent of the present settler population came to replace families which left.

In terms of origin, the settlers of Pindorama form a more heterogeneous group than in the previously discussed projects. Of the sample, 23.8 per cent came from the coastal area, 47.6 per cent from the Agreste, 21.4 per cent from the Sertão, and 7.2 per cent from parts of Brazil other than the Northeast. The high proportion of settlers from the Agreste region is also reflected in the previous agricultural status of settlers.

As many as 18 settlers or 45 per cent had been self-employed farmers, of which six owned a piece of land, while the remaining 12 rented land or worked as share-croppers; 32 per cent of the sample formerly were agricultural workers, while 22 percent had no prior agricultural experience.

9.2 Conditions in 1970

The diverse agro-industrial, commercial, and social activities of the Colony and Cooperative of Pindorama are managed through an elaborate, but very cumbersome and expensive administrative mechanism. Elected members of the cooperative include one director and two assistant directors. Also elected are six members composing an administrative council and six controllers making up a fiscal council. Office is held for three years and is subject to renewal for a second term. The three directors work full time, while the twelve councillors devote part of their time to the business of the cooperative. All are paid honoraria for their work.

Routine day by day business matters of the cooperative are carried out by a regular administrative and clerical staff, which is divided into several functional sections. Among these, the accounting division is the largest with a total of sixteen regular employees.

Each of the many industrial and commercial operations, such as the fruit juice processing plant, the feed mill, the tile factory, the saw mill, the pharmacy, the cooperative store, etc. is headed up by a manager, who normally has one or two assistants and a staff of regular full-time, and in some cases, part-time workers.

Pindorama

Processing Plant for Passion Fruit

In 1970, the cooperative had a total of 227 regular employees on its payroll. This represents roughly one cooperative employee for every two settlers. Monthly salaries in 1969 ranged from a low of U.S.$15 for a public school teacher, and U.S.$25 for a labourer, to a high of U.S.$125 to $175 for senior administrative personnel. As pointed out in the previous section, virtually all vacancies for skilled and unskilled workers are filled by selection from within the colony.

To reduce the many inefficiencies and high costs of the present system of management, a study conducted in 1969 by the Company for Agricultural Development of the State of Alagoas (CODEAL)[5] proposed a complete administrative reform for the cooperative. Without such reform, the report argued, improvements in the economic situation of the cooperative and its members will not be possible. An organization chart of the proposed administrative system is shown in Figure 18.

Under the new system, the general assembly, composed of all members of the cooperative, would continue to elect a fiscal and an administrative council. In addition, a non-elected advisory council, composed of professional agricultural advisors from SUDENE, CODEAL, and DAC (Department of Assistance to Cooperatives, a state organization), would be permanently attached to the cooperative. The position of the three elected directors would be abolished. All of the activities of the cooperative would be organized under five separate divisions as follows:

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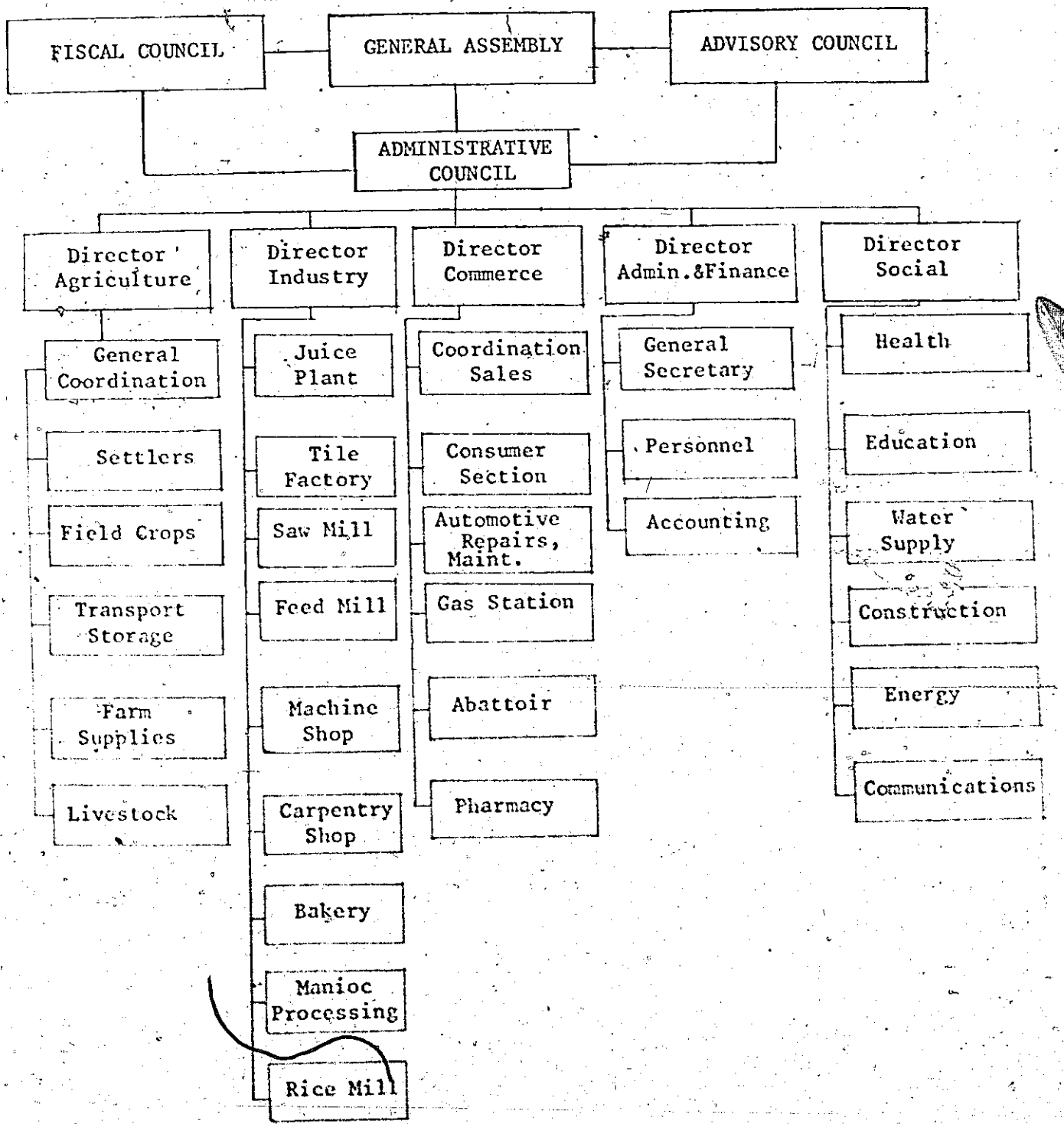
[5] Moab A. Silva, Relatório Parcial Pindorama. Ibid.

Figure 18

COLONY AND COOPERATIVE OF PINDORAMA

PROPOSED ORGANIZATIONAL STRUCTURE*



* Source: Moab A. Silva, Relatório Parcial Pindorama. Ibid.

agriculture, industry, commerce, administration, and a division for health and education. Each division is to be headed by a director. Directors would be skilled administrators and would need to be qualified in the areas for which they are responsible. All of the five directors would probably have to be hired from outside of the colony. Under each division director would be the managers and foremen of the different sub-divisions. Most of these would be individuals selected from within the colony.

While the proposed administrative reforms promise to bring greater efficiency to the cooperative, the prospect for their implementation in the very near future is limited. In April of 1970, members of the cooperative elected three new directors, who are expected to hold their position until April of 1973. Because of the very large investments made by the GAE, there may also be reluctance on the part of the German technical team to accede to the proposed reforms, and to relinquish their very considerable influence in the management of several critical enterprises of the cooperative.

Various data furnished by the cooperative and by the GAE show that most of the enterprises of the cooperative are profitable.

In 1969, the cooperative bought from settlers a total of 2,515 tons of passion fruit. The price paid to settlers was U.S.$46.50 per ton. Average yields of fruit juice per ton of fruit are twenty-four cases of twelve bottles each, with a wholesale value to the cooperative of U.S.$5.05 per case. Total production cost per case, including the cost of the fruit, of bottles, processing, labour, and plant amortization, is U.S.$3.70 per

case. Thus, total proceeds from a ton of processed passion fruit are U.S.$121.20, with total costs of U.S.$88.80 and a profit to the cooperative of U.S.$32.40. The potential net revenue to the cooperative from 2,515 tons of processed fruit would be U.S.$81,486. Actual sales of fruit juice, in 1969 came to 72,400 cases and included some unsold stock from the previous year.

In 1969, total profits of the cooperative from its different operations were equal to U.S.$173,787, and were derived as follows:[6]

1. Industrial Operations (Juice Plant, Saw Mill, Bakery, etc)	U.S.$105,149
2. Commercial Operations (Sale of Farm Supplies, Pharmacy, Consumer Section, Gas Station, Sale of Meat)	13,448
3. Other Operations (unspecified)	2,544
4. Miscellaneous Income (Interest from Loans to Settlers, Rental Fees on Vehicles, Tractors and Equipment, etc.)	52,645

While these profits are very considerable, and indicate the viability of most of the enterprises of the cooperative, they need to be applied against all of the other expenditures of the cooperative not covered by the individual operations. These include administrative costs, the cost of bank loans, expenditures for health and education, the maintenance of roads, vehicles, and equipment, and others. In 1969, these expenditures totalled U.S.$153,082 and were composed as follows:

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[6] Pindorama, Demonstrativo da Conta "Sobras e Perdas" No Balanço Encerrado em 31 de Dezembro 1969.

1. Administrative Expenditures	U.S.$38,045
2. Interest on Bank Loans	20,799
3. Operation and Maintenance of Vehicles, Tractors	43,776
4. Medical and Dental Assistance	11,205
5. Social Assistance	635
6. Technical Assistance	11,125
7. Operation and Maintenance of Schools	14,417
8. Maintenance of Roads	2,551
9. Conservation, Reforestation	8,962
10. Miscellaneous	1,513

Thus, with total receipts of U.S.173,787 and total expenditures of U.S.$153,082, the total profits of the cooperative in 1969 were only U.S.$20,705. In accordance with the statutes of the cooperative, these reserves were deposited into several funds as follows:

Social Welfare Fund	30%
Active Debt Fund	30%
Development Fund	27%
Reserve Fund	13%

The above statement of the receipts and expenditures of the cooperative does not show the very large contributions received from outside sources. In 1969, Pindorama received development grants and commodities equal in value to U.S.$135,000. Ninety per cent of this assistance came from German sources, the remainder from SUDENE and the

State of Alagoas. Without these "subsidies", Pindorama would not be able to maintain its present operations and programs.

Provisions at Pindorama for education, health and welfare, and technical and financial assistance to settlers suffer from many imperfections, but are very much superior to what families would find in other parts of rural Alagoas.

In 1968, Pindorama completed the construction of a large training center (CETRUP - Centro de Treinamento Rural de Pindorama). The center was built and equipped with grant funds provided by the GAE, the International Labour Organization, and SUDENE. Its immediate function is to meet all of the needs for improved skills of the cooperative's many full and part-time employees. Courses offered generally are of short duration and are problem-oriented. In 1969, several short-courses were provided in home economics, first aid, accounting, cooperative leadership, and community development. The school also offered courses designed to upgrade the qualifications of primary school teachers. In 1969, the school provided training to a total of eighty participants.

In the future, the training center is to function as a regular vocational college, to serve the needs of settlers and to prepare young people who need to leave the project for employment elsewhere.

The center still does not have a full-time teaching staff. There is also some question as to whether or not the school will be able to achieve its objective without continued and very considerable financial subsidies from outside sources. Except for several part-time instructors,

periodically on loan to Pindorama by different federal and state agencies, such financial support from entirely Brazilian sources is not guaranteed.

The colony has ten public schools, staffed by 33 teachers. Total enrolment during the early part of 1970 was 1,068. With an average family size of 7.3, and an estimated total population of 7,000 or little under 1,000 families for the entire colony, enrolment is an estimated 60 per cent of all school-aged children. In 1969, only three of the 33 teachers were licensed by the state. Nevertheless, as already pointed out, educational opportunities within the colony are better than in most rural areas of Alagoas. This is also confirmed by the testimony of the families that were interviewed; 86 per cent indicated that educational opportunities for their children are better than in the areas where they lived previously. Only at the CRC colony at Vitória was this percentage higher. Pindorama has no arrangements for formal education beyond the fourth grade. However, it is noteworthy that some of the schools in the different aldeias also offer adult literacy programs.

Every aldeia has either a first aid post or a more elaborate health center. Each of these offices has from one to three nurses in attendance. They will deal with minor emergencies, give injections, and provide assistance in childbirth. Each center handles an average of 20 cases per day. In more serious cases, transportation is provided to the urban center and, if necessary, to the hospital in Penedo. As many as 87 per cent of the settlers interviewed indicated that they find medical services better than what they could obtain before they came to Pindorama.

Pindorama

Agricultural Training Center

Pindorama

Medical Center in one of the Aldeias

Technical assistance and guidance is provided through the German technical team, and through so called orientadores. The latter are settlers who have proven themselves capable farmers, and who have received special training. Each aldeia has one orientador. He is responsible for the settlers of his area. His duties are to assist other settlers on questions relating to production, and to assure that serious problems, such as the outbreak of crop diseases or of insect infestations are promptly brought to the attention of a member of the German technical team or their counterparts in the cooperative. Orientadores are paid monthly salaries ranging from U.S.$20 to $50, but they are allowed to and expected to work their own farms as well.

Production activities of settlers, the management of a herd of 200 head of breeding cattle and the operation of the processing and bottling plant, are almost completely under the control of the German technical team. It is they who decide what settlers should plant, how they should space their crops, how much fertilizer they should use and so forth. Most of these instructions are based upon trials made at an experimental station maintained at Pindorama by the CAE. The German technicians will go out and actually visit with farmers, although normally, information is passed on through the orientadores.

The livestock herd was partly financed by the CAE, and contains different races of purebred beef and dairy animals. A livestock expansion program is supervised by a CAE veterinarian. Its objective is to carry out breeding experiments and to eventually provide settlers with a good stock of young animals. A hog production program initiated by the same

group, in 1968, had to be abandoned because of disease.

Involvement by the GAE in the operation of the passion fruit juice plant relates to GAE's heavy investments in new machinery, and in efforts to reduce and eliminate earlier inefficiencies and losses.

Through the cooperative, settlers are able to purchase fertilizer, insecticides, tools, plant material, and seeds. Credit is available to settlers who produce passion fruit, coconuts, pineapple, and rice. All of these crops are marketed through the cooperative. Settlers who decide to grow crops other than those promoted by the cooperative must get their credit elsewhere. Amounts of credit available to settlers are based upon their past production performance. In 1969, 88 per cent of the farmers interviewed obtained credit. Amounts borrowed ranged from U.S.$25 to as much as $644, with an average of $123 per settler. Credit is given for periods of six to twelve months at annual interest rates of 14 per cent. Except for very small amounts, credit is not paid out in one sum but is deposited in the settler's account to be paid out in monthly instalments, or is retained to cover purchases he makes from the cooperative.

As pointed out above, the cooperative will buy from settlers those crops for which a marketing system has been developed. Settlers' proceeds are not paid out in cash, but are credited to their accounts. If a settler has debts, deductions are made accordingly, if he has no debts, the amount in his account is paid out in equal monthly instalments. If the monthly amount he receives is insufficient to live on, he can take out a loan up to the amount of the value of his previous sale to

the cooperative.

Understandably, settlers are not very happy about this arrangement. Most settlers find that they are constantly in debt to the cooperative. In 1969, the average amount per family owed to the cooperative was equal to U.S.$364. This roughly represents the annual net income of a typical settler. One farmer lamented that the conditions at Pindorama are as bad as on the sugar plantation from which he came: "You make your fingerprint and ask for fifty cruzeiros, and they tell you that you can only have ten; they tell you what you have or what you owe, and how much you can spend, nothing is changed".

Contrary to what one might expect, the material position of the settlers at Pindorama, on an average, is not any better than that of Brazilian settlers in any of the previously discussed colonies. In a sample of 42 respondents, as many as 26 or nearly 62 per cent had annual gross incomes, in 1969, of less than U.S.$300, and only one settler attained an income larger than the suggested minimum of U.S.$1,500. Only 11 respondents, or one third, out of a total of 33 for whom the question was relevant, found it easier to feed and clothe their family than prior to settlement. This proportion is lower than for any other colony examined in this survey.

9.3 Agricultural Practices, Activities, and Income

Efforts over the past several years to improve the agriculture of the colony through the training and orientation of farmers have been characterized by positive results as well as many difficulties.

In a sample of 42 settlers, 90.4 per cent make regular use of chemical fertilizer, 97.6 per cent use insecticides, and 50 per cent practice some form of crop rotations. Since credit is tied to those crops the cooperative promotes and sells, there is little incentive for experimentation with other crops.

The practice of burning the land, even though discouraged, is universal. This is not surprising. Much of the land that was given to settlers was covered with dense brushwood or forest. After more than 10 years of occupation, most settlers are still engaged in clearing new land. New land is cleared to plant larger areas, but also for the more traditional reason of obtaining reasonable yields of such subsistence crops as manioc, yams, and corn, for which settlers do not normally use fertilizer, and are not given production credit. On parcels of 20 hectares and over, at least 5 hectares must be kept in forest. Apart from this regulation, the clearing and breaking of new land is actually encouraged. The rationale seems to be, that sooner or later such land will be planted to passion fruit, coconut, and other crops promoted by the cooperative.

The German agronomists have encouraged settlers to adopt less destructive methods of brush and forest clearing. Their efforts have met with only limited success. One of the German experts explained that one just cannot get fire out of the mind and life of these people, and that they will set fire to anything that burns. This behaviour requires little explanation. Fire is the quickest way of clearing new land and

of destroying grass, weeds, and brush cover. It is also a tradition. Settlers will make use of the tractors and implements provided by the cooperative, but feel that in clearing new land, such machines are too expensive when compared to the cost of burning. Occasionally, settlers will use tractors to pull stumps or to break up capoeira after it has been burned over.

Response on the part of settlers to adopt the various improved farming practices recommended by GAE agronomists has been very slow.

To conserve soil moisture in their coconut plantations, settlers were urged to bury coconut husks and other organic matter in shallow trenches around each tree. Instead of follwoing this advice, settlers continue to rake such material into piles and burn it. To halt or reduce the very destructive soil erosion, occurring on all sloping land throughout the area, the GAE technicians launched a massive educational effort, encouraging settlers to plant along the countours, rather than up and down the slopes as they were accustomed. The results were disappointing. Only a handful of settlers followed the instruction. When settlers were told that they could only obtain credit if they plant as they are told, many obliged, only to return to their old practice however, when they found that the sanction could not be rigorously enforced.

When passion fruit was first introduced on a large scale, settlers were told to interplant, and to utilize the space between the rows for corn and other crops. Since intercropping is a common practice throughout many parts of the Northeast, settlers readily adopted this procedure. In the meantime, experiments conducted at Pindorama have

shown that much higher yields of passion fruit are possible from closer spacing, and from plantations which are kept free of other crops. Now, settlers are difficult to convince that they should abandon the earlier practice.

The promotion of proper use of fertilizers and of crop sanitation measures has taken a great deal of patience and didactics. Settlers were told when and on what crops to use fertilizer and in what quantities. Since most of their farm supplies are bought on credit, few had any appreciation of the expense involved. Many reasoned that larger quantities will yield larger crops, others thought that what is good for one crop is also good for another, and squandered large quantities on manioc, corn, and beans, crops for which the use of fertilizer cannot be economically justified.

While the benefits of fertilizer were easily demonstrated with trial plots, settlers were more difficult to convince of the need to treat certain crops with fungicides and insecticides on a regular preventive basis. Even as late as 1969, and after more than a decade of experience with passion fruit, a settler lost his entire planting of three hectares of fruit because of an infestation of caterpillars. His orientador had told him to spray, but he refused, hoping that the "bugs" would go away just as they had come. When he realized the extent of the damage, it was too late.

Agricultural activities focus upon the production of passion fruit and coconut, the two principal crops of the colony. Of the 42 settlers interviewed, 39 settlers reported from 0.5 to 3.5 hectares of

passion fruit, and a total of 36 settlers had from 0.1 to as much as 20 hectares planted to coconut. In terms of income, passion fruit ranked first for 30 settlers, while nine settlers named coconut as their most important cash crop. The average area per farm devoted to each of the two crops is 2.0 hectares in passion fruit and 2.9 hectares planted to coconut palms.

The relative importance of other crops is evident from the following table:

Crop	No. of Settlers (out of 42)	Area(Hectares) Min.	Max.	Average
Manioc	26	.1	3.0	.5
Corn	27	.1	3.0	.8
Bananas	26	.01	2.5	.2
Sugar Cane	14	.3	6.0	1.4
Upland Rice	9	.2	3.0	1.6
Pineapple	12	.02	2.0	.5
Beans	5	.1	.5	.2
Mango	17	.01	.1	.03
Oranges	13	.01	.2	.05

The average area per farm under cultivation for the sample was found to be 6.9 hectares, while the average area actually planted to crops was only 5.4 hectares. For the most part, the difference reflects the practice of rotating small areas of subsistence crops unto a different parcel of land every year.

Pindorama

Passion Fruit (Maracuja) and Corn

Pindorama

Mid-day Lunch break in the Field

Pindorama

Settler's Coconut Plantation

Pindorama

Newly cleared Land planted to Corn

An income approximation of the potential annual gross revenue and of returns to family labour for a settler with 5.4 hectares of land and different crops in production, is shown in Table 7. The values cited assume full production, average yields for the area, average farm prices, and a family labour force of 1.7 adults, leaving a labour deficit of 51 man/days. Estimates of production expenditures other than labour were calculated on the basis of cost studies by the GAE team.

It will be noted that there is a large difference between the profitability of passion fruit and coconuts. Gross returns to labour per man/day (not considering production expenses)[7] on passion fruit are only U.S.$1.24 as compared to nearly U.S.$8.00 per man/day for coconut. Because of the very low labour requirements for coconut, once a plantation has come into production, it is one of the very few crops which would allow a settler who only uses the hoe and who depends exclusively on the labour resources of his own family, to make effective use of more than five hectares of land. However, this solution is only practical in long-range plans and in combination with the production of other profitable crops, which will permit settlers to assume the financial burden of establishing such plantations. The time period involved before coconut palms begin to produce is six to ten years. Full production is not reached until plants are fifteen to twenty years of age.

The actual income position of the majority of the settlers of Pindorama is less favourable than that indicated by the approximation.

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[7] No cost data could be obtained for coconut.

APPROXIMATION OF POTENTIAL INCOME POSITION

SETTLER OF PINDORAMA

Product	Area ha	Yields per ha.	Total Prod.	Average Prod.Price $	Total Value of Prod. $	Total Labour M/D
Passion Fruit	2.0	4 tons	8 tons	46.50/ton	372	300
Corn Inter - Planted with Passion Fruit	(0.6 equiv)	700Kg	420 Kg	45.00/ton	19	40
Coconut	2.9	2000fruit	5800	10.00/100fr.	580	73
Manioc	0.5	8000Kg	4000 Kg			60
Manioc Flour			1330 Kg	0.14/ Kg	186	60
Total	5.4				$ 1,157	533

Potential Annual Gross Income U.S.$1,157

*Average Expenditures for Paid Labour (51 days x $0.80) U.S.$41
*Average Expenditures Other Inputs 103
*Average Expenditures Total 143
Potential Average Net Returns U.S.$1,013

Total Family Labour (533 M/D less 51 days): 482 Man/Days
Potential Average returns to Family Labour 1,013/482 U.S.$2.10 Man/Day

Average Annual Gross Income of Sample U.S.$ 422 Minimum U.S.$ 44 Maximum U.S.$1,875

Proportion of Settlers in Sample with Annual Gross Income less than U.S.$1,500 97.6 per cent.

*Based upon sample data

Of a total of forty-two respondents, twenty-six settlers or 61.9 per cent had annual gross incomes of less than U.S.$300, thirteen or 30.9 per cent had incomes between U.S.$300 to $900, two or 4.8 per cent had incomes between U.S.$900 and $1,500, and only one settler, with a gross income in 1969 of U.S.$1,875 exceeded the suggested minimum of U.S.$1,500.

Roughly similar values were obtained in a comprehensive survey conducted by the GAE in the beginning of 1969, in which an assessment of the 1968 income position of all settlers in the project was made. On the basis of this survey, four farm types and income categories were identified, as follows:

Type of Farm	Percentage of Settlers	1968 Average Ann.Gross Inc. U.S.$equiv.
1. Settlers without commercial crops (i.e. crops sold by the Co-op)	21.9	190
2. Subsistence crops, passion fruit and rice	49.1	479
3. Subsistence crops, and coconut coming into production	26.3	681
4. Subsistence crops, passion fruit, and coconut in full production	2.7	1,901
	100.0	
Weighted Mean Annual Gross Income (all settlers)		$ 493

The large difference between the estimated potential annual gross income shown in the approximation and the actual average annual

gross income indicated by the sample survey and by the GAE survey relates to the fact that coconut plantations at Pindorama are only in the initial and very early phase of production. Also, as pointed out in previous chapters, a very limited quantity of settlers' production of manioc flour and of other crops grown for family consumption enters the market.

The GAE survey found that average annual expenditures per family on purchased food are equal to U.S.$260.[8] The value of the food produced and consumed by the family was found to be little over half of this amount or approximately U.S.$140.

If the latter value is added to the GAE figure for average annual gross income, the total value of production of the average settler would be equal to ($493 plus $140) U.S.$633. If the average cash operating expenditures of the sample group of U.S.$103 is considered representative; further, if it is assumed that all labour is carried out by the family, and if labour requirements on a 2.9 hectare pre-productive coconut plantation are only forty instead of seventy man/days, total returns to family labour would be equal to (($633 less $103) ÷ 500) U.S.$1.06 per man/day.

Conditions at Pindorama for improvements in settlers' income position are somewhat more favourable than in the projects where sugar cane is the major cash crop. However, here as in other colonies, the price settlers must pay for such improvements is high, and the necessary conditions and factors are usually beyond their control.

The decision made some years ago, to establish coconut plantations at Pindorama was far-sighted, and no doubt was motivated by

[8] Compare with author's estimate of U.S.$462 to be spent on purchase food (Income model Chapter 4.2).

the crop's relative profitability, its low demands on labour, and its promise of a year 'round cash income.[9] However, planning left much to be desired. Without giving much consideration to the soil moisture requirements of coconut, settlers in all parts of the colony were encouraged to plant at least one hectare of palms. Between 1963 and 1970, some 500 hectares were planted. Some of the plantations are now coming into production. In all of the upland areas of the colony, many settlers are now discovering, to their great dismay, that the trees they have tended for nearly seven years, are shedding their fruit prematurely. A simple investigation revealed that the upland tabuleiros soils are too permeable and have too low a watertable to be suited for coconut production. It is estimated that at least one third of all settlers who planted coconut will be affected by this problem. They will have to abandon the crop unless measures can be found to correct the soil moisture deficiency. On the other hand, settlers with plantations in more favourable areas, can look forward to a very substantial increase in their incomes once their trees come into full production.

The production of passion fruit provides another example showing that few, if any of the decisions affecting the profitability of settlers' efforts and inputs are within their own capacity of choice. Previously, settlers were instructed to grow only 500 plants per hectare, and to utilize the space between rows for subsistence crops. Average yields under this system of cropping were four tons of fruit per hectare.

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[9] Coconuts are harvested every month of the year.

Now, settlers are to plant 1,500 vines per hectare, to space rows more closely, and not to interplant with other crops. Average yields expected as a result of this innovation, are ten tons per hectare. While expenditures for labour and fertilizer will increase as well, returns to family labour are expected to more than double.

The benefits of such, often simple improvements can be considerable and are to be found in other improved farming practices. Yet, given the settler's generally precarious economic situation, the limited economic incentives, and the imposition of all manner of directives from above, his alleged freedom to make decisions for his self-betterment, in reality is very limited.

The rewards to settlers for risk-taking, innovativeness, and independent effort are often questionable.

To widen settlers' income base through crop diversification, the cooperative recently introduced the production of pineapple, and hopes to promote the crop on a large scale. Because of settlers' lack of familiarity with new and specialized crops, questions about profitability, and the cooperative's difficulties in the past in developing markets, there is an understandable reluctance to innovate. Most settlers prefer to wait to learn from the mistakes of others. Such caution seems justified.

The cooperative hopes to market the crop in central and southern Brazil, and eventually also to export to Argentina. Pineapples require eighteen to twenty-four months from planting to harvest. Expenditures for labour and fertilizers are high. Because of the perishability of the crop, harvesting, transport, and marketing arrangements must be well-coordinated.

Furthermore, for shipment to distant markets, the fruit must be graded, and carefully packed in wooden boxes which must conform to government norms. During the first, very small pineapple harvest, in 1969, the cooperative failed to convince settlers that it has the capacity to cope with all of these requirements.

In contrast to efforts by the cooperative to promote certain types of crops, innovativeness on the part of settlers with other crops is discouraged, and in the case of sugar cane is penalized. Settlers are not permitted to grow sugar cane other than for local use as animal feed. Those ignoring the restriction are barred from obtaining credit and technical assistance, even if they do sell other crops to the co-operative. This sanction has not been entirely effective. In a sample of forty-two settlers, as many as fourteen were growing some sugar cane, of which eight produced the crop on a commercial basis.

The cane produced at Pindorama is a special variety which enjoys a wide market. It is bought by small bars and restaurants to make fresh cane juice (calda de cana), which is a popular drink throughout the Northeast.

While settlers who grow cane usually deal through middle-men, several of those interviewed claimed that the crop is three times as profitable as passion fruit. Apart from this factor, it is a crop which is relatively easy to grow, and with which many settlers are familiar.

Efforts to obtain a satisfactory explanation for the cooperative's sanction on sugar cane were unfruitful, although, it would seem that without these restrictions, a larger number of settlers would

produce sugar cane. This could have an adverse effect upon the production of passion fruit, and in turn upon the cooperative's profits.

Because of soil conditions, which in most parts of the colony do not permit the establishment of good pastures, the prospects for significant increases in farm incomes from cattle production, are very limited.

Of forty-two settlers interviewed, only five had from one to seven head of cattle. All of these settlers, however, had lots with some valley land and good natural pasture. Settlers' income from the sale within the colony of poultry and eggs was negligible. Commercialization on a larger scale is generally beyond the capacity and resources of the individual settler.

9.4 Conclusion

The plan proposed in 1954, by the Companhia Progresso Rural, to establish a large agro-industrial settlement project at Pindorama, must have seemed like the perfect answer to many of the agricultural and rural problems of the time. Landless families would be provided with the means to improve their material position. They would receive better housing, health care, and educational facilities. Production and marketing would be carefully organized. Settlers would no longer be dependent upon their patrão or upon unscrupulous middlemen. They would receive technical assistance, essential farm inputs, and credit. And they would be guaranteed a market and a fair price for their product. Through the establishment of a number of small industries, additional employment would be generated, and larger profits would accrue to settlers.

Reality frustrated many of these intentions. Despite the huge sums that were invested in the project over the past eight years, progress has been very slow. The results, if measured in terms of improvements in settlers' levels of living and of material comfort, are largely unimpressive.

While lack of sufficient funding and of support may be the facile explanation for the shortcomings of other settlement projects, the same argument would fail to convince if applied to the case of Pindorama.

The experience of Pindorama shows that the problems of colonization are not unique, but are the same problems inherent in the transformation of traditional agriculture in other parts of Northeast Brazil. Such transformations are not achieved by productive investments alone, but demand sustained and parallel efforts aimed at the transformation of human resources and of traditional values, attitudes, and aspirations. The latter is without question one of the more arduous and difficult development tasks, and while it ought to rank highest among priorities, it is generally accorded the least amount of attention.

Recent efforts made at Pindorama to improve the technical capabilities of the cooperative's staff and the abilities of farmers, indicate that the importance of this factor is recognized. However, in the past, the emphasis has clearly been upon more tangible inputs and upon obtaining quick and measurable results.

The large investments that were made in infrastructure, machinery, equipment, farm inputs, and the organization of production,

processing, and marketing, demanded concrete, economic returns. When overly optimistic expectations failed to materialize, the constraints identified demanded better roads, more trucks, improved processing equipment, better farm inputs, more workers to do the job, and, invariably, still larger investments. The result was an elaborate and very costly administrative and productive mechanism, operating inefficiently because of relatively limited efforts made in the development of the project's human resources.

Furthermore, the well-intended but excessive paternalism of the various organizations that have assisted Pindorama, has done little to foster settlers' progress to independence. By giving too freely of what settlers had not learned to earn for themselves, patterns of dependence which need to be broken, were further reinforced and entrenched.

Finally, it goes without saying that the work done at Pindorama should have been done by Brazilians. René Bertholet, the former director of the project, in reflecting on the early lessons he had learned, raised a similar point: "Ten absolutely dedicated Brazilian technicans could have made Pindorama a success, but they didn't exist, or at least, I couldn't find them. And without Brazilians, there can be no land reform"[10]

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[10] Statement by Bertholet to Chief Latin American Correspondent of Newsweek, Milan J. Kubic. Newsweek, Jan. 13, 1964, Pg. 37.

PROJECT SUMMARY

PINDORAMA

AGENCY: Cooperativa de Colonização Agrícola Pindorama
LOCATION: Municipality of Penedo and Coruripe, Alagoas
DATE ESTABLISHED: 1954 by the Companhia Progresso Rural (CPR)
COST ESTIMATE: No Data (Estimated total of U.S.$4.9 mill. assistance from Germany, Holland, Switzerland, and the United States)
FUNDING: Bank of Brazil, State Bank, Foreign Sources

TYPE OF SETTLEMENT:
Size: 34,000 hectares
Number of Lots: 420
Layout: Dispersed and nucleated housing
Lot Size: 35 hectares
Tenure: Arrangements pending; eventual distrib. of titles

PHYSIOGRAPHY:
Mean Annual Rainfall: 1,344 mm
Mean Annual Temp.: 24.4ºC
Wet Season: March to August
Dry Season: Sept. to Feb.
Topography: Flat uplands, broad valleys with slopes up to 35%
Soils: Sands, sandy clays, tabuleiro soils, valley soils.

ECONOMIC DATA:
Principal Crops: Passion Fruit, Coconut, Rice, Pineapple, Corn, Manioc, Beans, Bananas
Livestock: Poorly developed; some cattle and poultry
Services: Marketing of cash crops, credit, technical assistance, sale of farm inputs, mechanical equipment, agricultural education and orientation.
Industry: Fruit Juice Processing, Rice Mill, Feed Mill, Brick Factory, Saw Mill
Settler Incomes: Average Annual Gross Income U.S.$493
Range U.S.$190 - $1,901
Estimated Average Value of Production per ha. of land in crops: U.S.$117 (Potential with full production:$214)
Estimated Average Returns to Labour: U.S.$1.06 Man/Day
(Potential with full production:$2.10 perMan/Day

SOCIAL DATA:
Ave. Family Size: 7.3
Ave. Age of Settler: 43.8
Services: Primary Education, Adult Literacy, Vocational Training, Health Services and Health Insurance.
Total Number of Families: Estimated 1,000 in 1969.

X

COLONY AND COOPERATIVE OF TREZE

10.1 History and Development

If one is prepared to overlook the circumstances which led up to the establishment of the Colony of Treze, the project represents one of the most impressive efforts in land settlement and cooperative development in Northeast Brazil.

The colony is located in the State of Sergipe, some 66 kilometers southwest of Aracaju, the state capital, and 13 kilometers east of the Town of Salgado (Fig. 19). It is the distance between Salgado and Treze from which the project derived its name. The original part of the colony comprised some 1,338 hectares of virtually level land, which previously had been a sisal plantation. In 1969, an additional 2,002 hectares of adjacent land were acquired, making a contiguous total area of 3,340 hectares.

Physiographically, the area is within the humid Agreste of Sergipe, the transition zone between the humid coastal region and the drier interior. Annual rainfall is 1,200 mm, with an average of 147 mm at the peak of the rainy season in May, and an average of 38 mm in January, which is the driest month. Rainfall is somewhat less reliable than in any of the previously discussed areas. Annual mean temperature is 24.2°C.

The agriculture of the surrounding region is characterized by livestock grazing, and the production of sisal, cotton, beans, and corn, as well as manioc, yams, and other root crops. Most of the land is held

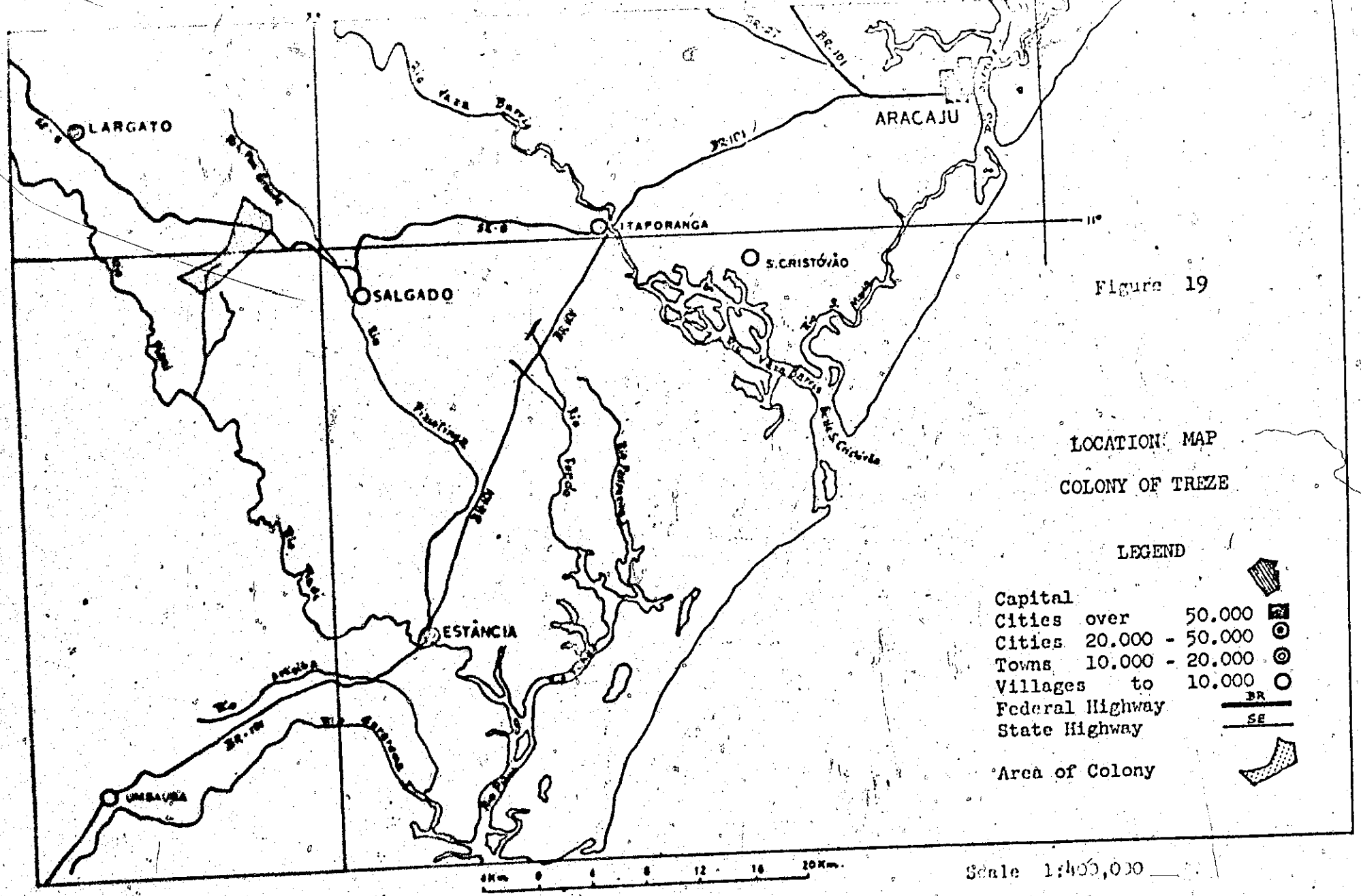

LARGATO
ARACAJU
ITAPORANGA
S.CRISTÓVÃO
SALGADO
ESTÂNCIA
UMBAUBA
11°
LOCATION MAP
COLONY OF TREZE
LEGEND
Capital
Cities over 50.000
Cities 20.000 - 50.000
Towns 10.000 - 20.000
Villages to 10.000
Federal Highway BR
State Highway SE
Area of Colony
0 4 8 12 16 20Km.
Scale 1:400,000

Figure 19

in latifundium-type properties, but there are also many small farmers with properties usually less than ten hectares in size. Few of these hold clear titles to their land. Sharecropping and renting arrangements are common throughout the area.

Geologically, the area of the colony is an extension of the coastal tabuleiro series, and except for a few gentle valley slopes, is characterized by level or nearly level topography. Elevation above sea level is 180 meters, with a maximum local relief of 35 meters. The predominant soils are coarse and muddy sands, and sandy clays.

The project is served by State Highway SE-103, a paved road which traverses the colony and connects with Federal Highway BR-101, thirty kilometers south of Aracaju.

Like some of the previously discussed projects, Treze also had a rather irregular beginning. In 1960, Antonio Praga, the owner of the 1,300 hectare fazenda and sisal plantation was in financial difficulties and declared himself insolvent. The land was auctioned off to the highest bidder and became the possession of a man named Antonio de Menezes. The new owner had political ambitions; Agrarian reform was a popular subject at the time, and the distribution of the property among landless local families seemed the right thing to do.

There was no official plan, and no clearly spelled out objective. The division and distribution of the land posed no serious problems. The area was level, clear of forest and brush, and had already a reasonable network of roads. To accomodate as many families as possible, lots were marked out in 1.5 hectare parcels along the highway traversing the

property and along major side roads. A few large families were given double lots of 3 hectares each. The land was given out free, but settlers were required to pay off loans for the construction of houses, which Meneses had arranged through the Bank of Brazil.

About 70 families were accepted into the settlement during 1961, when some questions were raised about the feasibility of the scheme and the ability of settlers to pay off their debts. Meneses had no interest beyond the distribution of the land, and relieved himself of any further responsibility by turning the project over to the Bank of Brazil, to continue the work he had begun. In view of the Bank's financial interest in the project, it had little choice but to accept the offer.

The Bank wasted little time. It ordered a feasibility study, made arrangements to open a line of production credit to settlers, enlisted the help of the National Institute for Agrarian Development (INDA) and of the State Extension Agency (ANCARSE), and in September of 1962, organized the Cooperativa Mista dos Agricultores do Treze Ltda. The following year, it appointed one of its own men, Francisco Mota, as administrator of the project. Luiz Alves de Oliveira, a professional accountant and a senior employee of the Bank, was appointed project coordinator.

Like the young interventor of Tiriri, Mota, although much older, and now in his early forties, seemed an unlikely choice. He was a recent employee of the Bank, had no agricultural background or experience, and before coming to the Bank had worked with Sul America, a large insurance company. However, Mota brought other qualities. He understood the people,

and knew that if the project was to succeed, it would have to be through the peasant's own effort. He also brought with him a business background and organizational abilities.

Luiz Alves, a slightly older man, also lacked any formal background in agriculture, but was endowed with similar personal qualities as Mota, and believed, as Mota did, that the peasants needed opportunity rather than charity, and that their dignity and progress could only spring from the fruit of their own labour and personal growth.

The two men came to Treze during the early part of 1963, and have worked together since that time, to develop what has since become the largest and most successful farmers cooperative in Northeast Brazil.

One of the first tasks was to modify the original, haphazard plan, and to sub-divide the larger, and still unoccupied area of the colony. All new parcels were made eight hectares in size. Smaller lots of one quarter hectare were set aside for the construction of settlers' houses along all major roads. To facilitate later readjustments in farm size, should this become necessary, farming and residential areas were kept separate. However, farm lots were so arranged in relation to housing lots, that none of the settlers live more than a ten-minute walking distance from his land. Families already in the colony when the Bank took over, were given the option of buying an additional seven hectares of land. Like all new settlers coming into the project, they were required to pay for such land.

The price for any particular lot was established at the time it was officially and contractually assigned to a settler. To receive

a contract and to become an official settler of the project, a candidate had to satisfactorily complete a twelve-months probationary period. In 1970, the total price for an eight hectare farm lot and a one quarter hectare residential lot varied between U.S.$300 and $700, depending on the distance of the property from the main highway. Property debts must be paid off over a fifteen year period, and are not subject to monetary correction or interest charges. Of a total of twenty-seven settlers interviewed in May of 1970, sixteen had already paid off their debt in full and have received titles to the land. Nine were making regular annual payments, and only two had not commenced payments on their properties.

Between 1963 and 1970, the number of settlers at Treze increased from 70 to 270. An additional 150 lots are waiting to be occupied. The procedure adopted to select settlers was very rigorous, and has remained essentially unchanged to the present time. A prospective candidate for settlement must be a native-born Brazilian, and should preferably have an agricultural background. He must be prepared to live in the colony and devote himself to full-time work on his land. He may not hold another job, or rent out any portion of his land. He must provide references from his previous landlord, or, if he worked for himself, from members of the community in which he previously resided. He is also required to pay an entrance fee equal to U.S.$10. This amount is refunded if he fails to be accepted at the end of the twelve-months trial period. Each application is presented before a general assembly of the settlers, to hear and consider any objections that may be raised. The final decision

to accept or reject an applicant is made by the president and the administrative council of the cooperative. If the applicant is accepted, his case is reviewed in the same manner at the end of the probationary period.

Once a candidate is accepted on a probationary basis, it is almost certain that he also becomes a settler. According to Mota, the number of families that have left the project voluntarily, either during the trial period or after they were given contracts, is negligible. To date, only one settler has been asked to leave after being accepted on a permanent basis. If a settler fails to live up to the regulations and expectations of the cooperative, it is the cooperative which assumes responsibility for his shortcomings. Instead of expulsion, which is considered the last resort, a special effort is made to identify the settler's problems, to assure him that he is not alone in solving them, and to provide whatever moral and other support he may need.

Among twenty-seven respondents interviewed, twenty-three or roughly 85 per cent were born and raised in the same municipality in which the colony is located. Two came from the zona da mata and two came from other parts of Brazil. Of the sample, as many as eleven had been owners of small parcels of land but did not have clear titles, five had been sharecroppers, and eight had been farm workers on fazendas and sugar plantations. Only three settlers in the sample did not have prior agricultural experience.

None of the settlers who came to Treze after the Bank took over in 1962, were provided with housing. Except for small amounts of credit and construction plans provided by the cooperative, habitation

is the settler's own responsibility. When asked about the possible hardship this entails, the author was told that such hardship was not without purpose. To build and own a house was to be one of the early material goals of the new settler.

He arrives at the colony and is assigned a parcel of land. If he is destitute, as many are, he builds only a crude shelter of sticks and palm leaves. Depending on the season, he is encouraged to begin working his land immediately. If he arrives during the early part of the rainy season, the cooperative will provide mechanical equipment to prepare as much land as he can plant and cultivate in the first year. The cooperative will also provide him with seeds, plant material, and fertilizer, for which he pays at harvest time. A technician, or an experienced settler will give him whatever guidance he needs. His first crops usually will be manioc, beans, and corn, as well as some tobacco, yams, or sweet potatoes, which are important cash crops. If he arrives at the end of the rainy season or during the dry season, most of his time will be spend in land preparation, but the work will be done manually. Since most of the area is free of forest, land preparation involves burning over light brush and weeds, and breaking the soil with the hoe. If necessary, the cooperative will pay a small monthly subsistence allowance to provide for him and his family until his first harvest. At harvest time, he delivers what he has to sell to the cooperative. The cooperative deducts what he owes and credits the rest to his account. If his debt is larger than his credit, it is carried over to the next year.

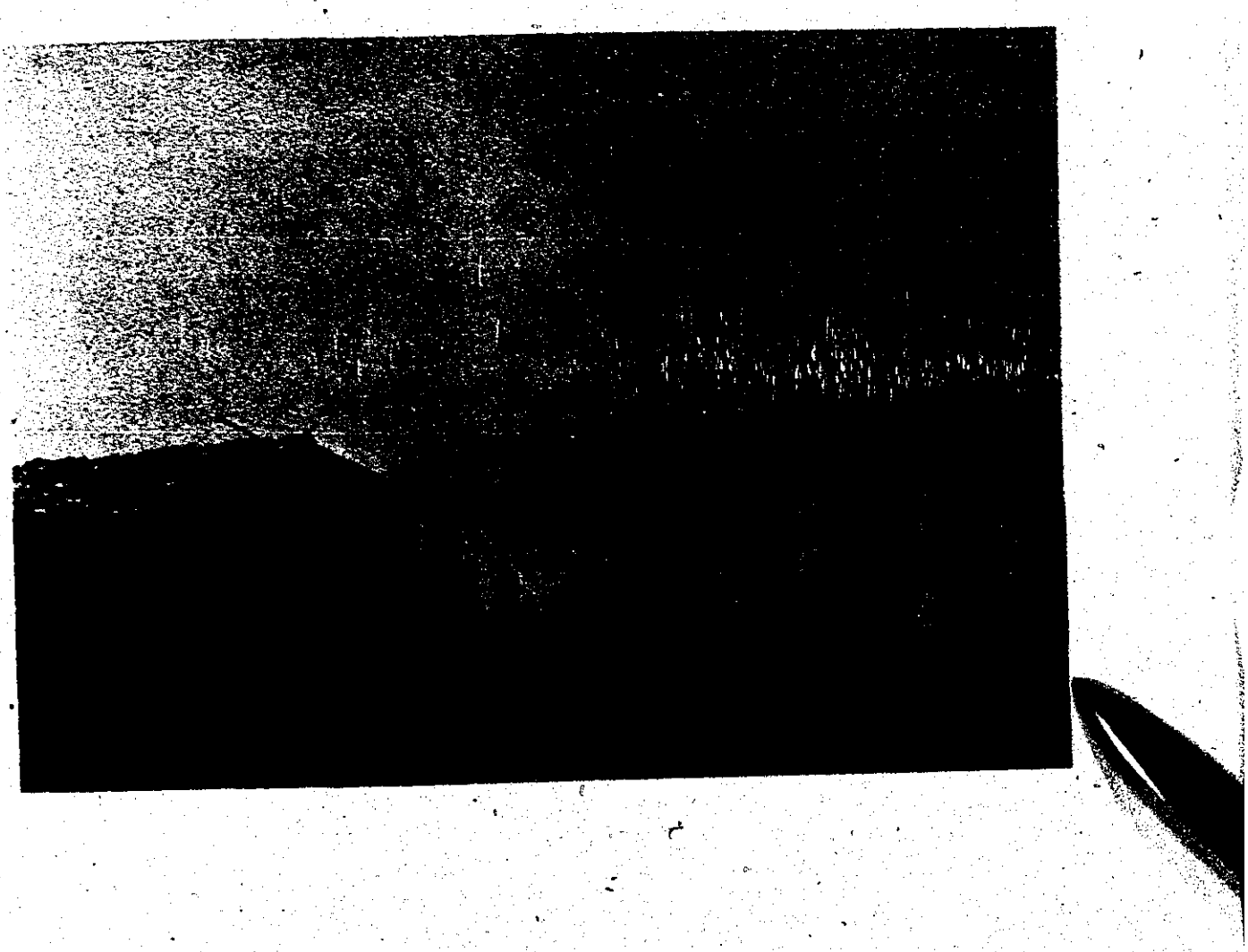
Entering the second year, and having been accepted into the project, he spends some time with the construction of a modest mud and pole type house (casa de taipa). The cooperative may provide a small loan to buy tiles for the roof. The poles and sticks used to weave the frame of the house are obtained from the communal forest of the cooperative, and in some instances on the settler's lot itself. Construction of the house is carried out by the settler himself in piecemeal fashion. Sometimes a settler will enlist the help of a neighbour. The cooperative continues to provide production credit, and consumption credit if necessary. However, every effort is made to counsel and to encourage the new settler in his production activities, so that by the end of the second year he will already have a large enough income to pay off his credit debt, to pay the first installment on his lot, and to leave him with a sufficient surplus to carry him into his third production year. This he achieves by maintaining or increasing his area in subsistence crops, according to the family's needs, and by planting as much land as his labour resources will permit to tobacco, sweet potatoes, and yams. If all goes well, by the end of the third or fourth year, his annual volume of production and gross income will be sufficient to enable him to carry, in addition to his annual production loan, a second loan to buy bricks, tiles, sand, and cement to built his house. The work is done by an outside contractor, although usually the settler helps with, as well as supervises the construction. In most cases, the house is only completed to the stage where it is habitable. The plaster, stucco and paint come one or two years later, when the settler can afford it. The houses built have a

kitchen, living room and two to three bedrooms. A privy and laundry facilities are usually added at a later time. The old mud and stick house is used as a storage area for crops and tools, or is torn down. Many of these primitive dwellings can still be found at Treze, and remind one of the humble beginning of the settlers.

In the light of the above procedures, the "purpose of the hardship" of settlers, referred to earlier, is largely self-evident. In the process of moving from a mud shack or an even humbler dwelling to a regular brick house, they learn a great deal about the value of money, about budgeting, and about saving. The civic, social, and psychological benefits are immense. Through his own efforts, the settler has become a home owner, he is "fixed" on the land, he has a personal stake in the cooperative and its success, he is a respected member of the community, his community. This feeling of attachment also extends to his land which was the source of his now visible wealth, and to the cooperative and its staff which has treated him with dignity and has accepted him into the community as an equal.

The infrastructure developed at Treze is not very elaborate. It consists of essential roads and buildings. Expansion takes place very gradually and in accordance with needs. All of the buildings of the cooperative are located along the main highway. There is a cooperative store, an office, a meeting hall and a warehouse for the storage of fertilizer and other farm supplies.

A study commissioned in 1962, by the Bank of Brazil recommended the production of two basic crops: tobacco and manioc. Accordingly,



Trece

"From a humble beginning...."

Cooperative and Administrative Center of Trese

facilities were constructed to handle both crops. There is a large tobacco curing and treatment house and a warehouse for storage prior to shipment. The processing of manioc is fully mechanized, and is carried out in a central mill. A portion of the flour is returned to the settler for family consumption, the rest is sold by the cooperative. A few settlers have their own small manioc processing mill or casa de farinha, but processing has become strictly an off-season activity. Most settlers have learned that it is not profitable to spend 120 man/days in growing a hectare of manioc and another 120 man/days in processing the roots. The growing of the roots is profitable but not the manual processing. There are also a mill for grinding corn, and 12 silos for the storage of manioc flour, corn, and beans.

The cooperative is organized in accordance with the regulations established under the Brazilian Land Statute. There is an administrative council of eight elected members. It consists of a president, a vice-president, a secretary, and five council members. Positions are held for three years. There is also a fiscal council, consisting of three members and three assistants, elected for a period of one year. All elected members are paid a small honararium. Ordinary council members are paid $2.50 for every meeting they attend. The president, vice-president and secretary who devote their full time to the management of the cooperative, are paid from $60 to $80 per month.

The salaried staff of the cooperative, in 1970, was made up of ten people. These included Mota, the director, an accountant, five clerical workers, two truck drivers, and a tractor operator. Monthly

salaries ranged from $60 per month for motorist and administrative staff to $125 for the director. In addition to their salaries, all regular employees are provided with free housing. The director also receives one per cent of the profit of the cooperative - an unlikely incentive at the time Mota took control in 1963. Luiz Alves acts as full-time economic and financial advisor to the cooperative, but his salary continues to be paid by the Bank of Brazil.

Manual work connected with the preparation of tobacco and other activities, is carried out by members of the cooperative. Work is paid by the day and members are eligible on a rotating basis. However, this work is not compulsory, and if there are not enough volunteers, particularly at harvest time when settlers are busy, outside workers are hired to help out.

Under the energetic and capable leadership of Mota and Luiz Alves, Treze has been making slow but very steady and visible progress. The Bank has given sound financial backing to the cooperative. Mota has been able to enlist the assistance of the state extension service, ANCARSE, and of other organizations including SUDENE. An effective marketing and procurement system has been developed. The cooperative has its own trucks and buys and sells in most of the major cities of the Northeast and as far south as São Paulo.

Shortly after the cooperative was founded, in September of 1962, it also opened associate membership to small independent farmers, renters, and sharecroppers from the surrounding region. By June of 1970, the cooperative had 270 members who are settlers, 340 associate members,

and 82 pending applications for membership. By the time of the author's second visit to the project, in June of 1971, the associate membership had increased to just under one thousand.

Candidates for associate membership must be sponsored by two other members, who may be settlers or associate members. Applications are reviewed in the same manner as those for prospective settlers. The privileges and obligations of associate members are virtually the same as those of settlers.

With the continuous growth in membership, the Cooperative of Treze is embarking upon an ambitious expansion program which may eventually reach every small farmer in the State of Sergipe. Immediate plans are to open five farm service centers in neighbouring municipalities. Each center will have a depot for the storage and sale of farm supplies, will purchase farm products, and will provide production credit and technical assistance to members. The cooperative has also begun to buy up large fazendas for sub-division and resale of the land to its members.

10.2 Conditions in 1970

The settlers of Treze live as frugally as most of the families in any of the previously discussed projects. Yet, what they have to show for their effort is truly impressive. Many of the earlier settlers have already paid for their land, and have paid off the loans received for the construction of their houses. Their progress is evident from the many neatly stuccoed and painted houses which line the roads, from the better furnishings they are buying for their homes, from the radio found

in virtually every house, and more recently, with the electrification of the area, from the television sets which are becoming popular. In 1970, it happened for the first time that a settler applied for credit to buy a small pick-up truck. His request was granted.

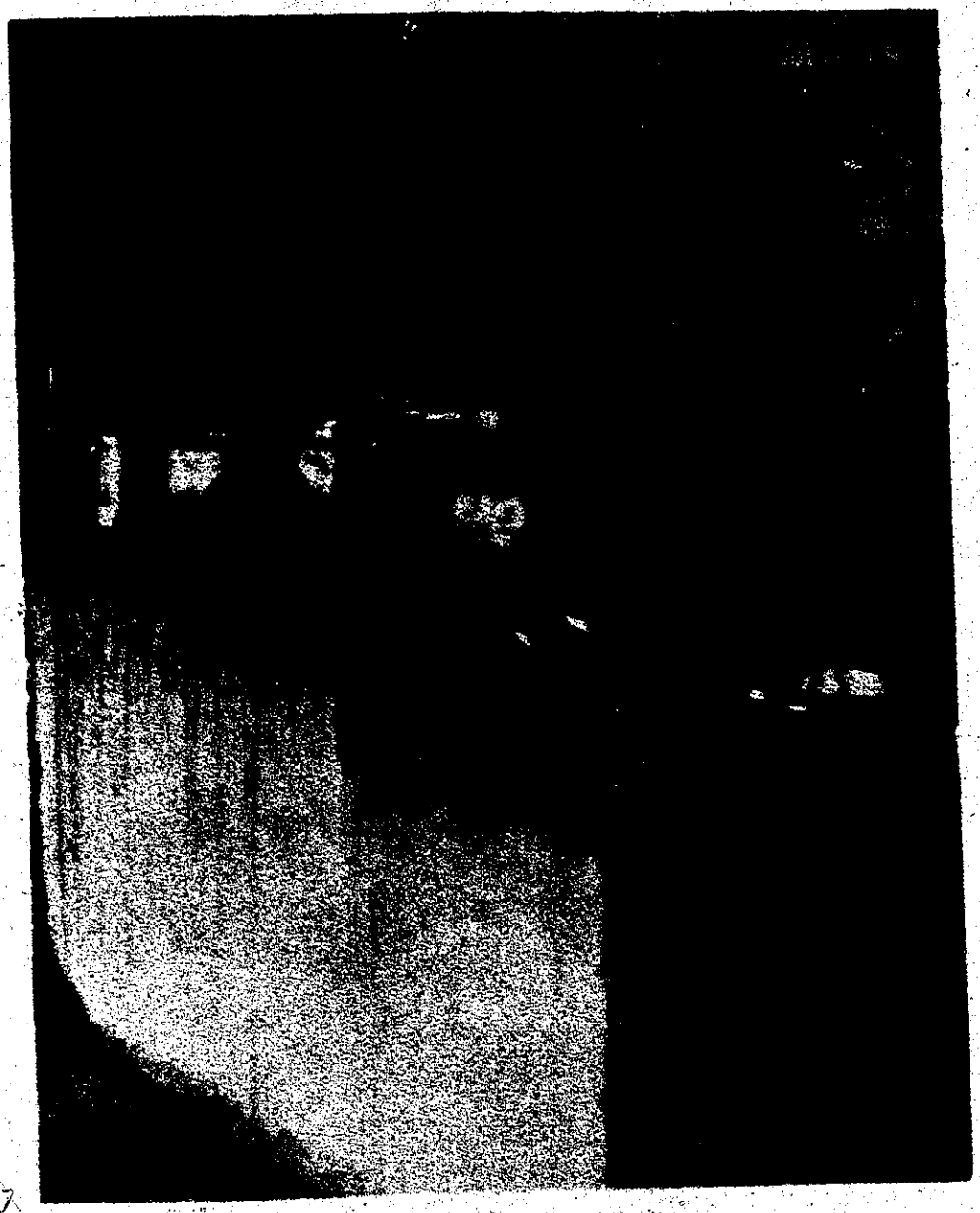
The apparent consumer buying power and impressive gains in the net worth of settlers, seems difficult to reconcile with an average annual gross income which reaches only about U.S.$700 in a normal crop year. However, there are several factors which have allowed these families to save a relatively larger amount of their income than those in other projects. While farm expenditures for fertilizers, insecticides, improved seeds and plant material and the rental of mechanical equipment are high, and are, on an average, one third of the value of the annual gross income, settlers are encouraged to make maximum use of the family's own labour resources. The hiring of outside labour is discouraged. Unlike in most other projects, children of settlers contribute heavily to the family labour force. During the annual tobacco harvest, attendance at school becomes a secondary concern. Secondly, settlers of Treze have achieved a greater degree of self-sufficiency in producing the food consumed by the family than those in other projects. Virtually all families are self-sufficient in beans, manioc flour, and yams, which are three important staples in their diet. In addition, most families have several fruit trees, as well as a small vegetable garden which the children have been taught to tend. Virtually all families raise a few chickens. While attempts on the part of the family to be self-sufficient in such staple

food crops as manioc, normally makes an excessive demand on the family's limited labour resource, at Treze this problem is mitigated by the completely mechanical processing of manioc. Finally, the orientation provided to settlers by the staff of the cooperative places constant stress upon the virtues of thriftiness, budgeting, and wise spending. Thus, fewer expenditures on outside labour, fewer expenditures on purchased food items, and the teaching of providence, have allowed settlers to set and attain many material goals, which would not have been possible otherwise.

Approximately forty-five per cent of the present settler population of Treze has been in the project for five years or less. This is reflected in settlers' very variable testimonies about improvements experienced in levels of living. Among twenty-three respondents for whom the question was relevant, eleven indicated that they now find it easier to feed and clothe their family than prior to settlement. Seven indicated that there has been little or no change, and five felt that they find it more difficult to "make ends meet".

In contrast to the above, among twenty-seven respondents, as many as twenty-two or 81.5 per cent indicated that they now live in a better house than prior to settlement. Three indicated no change, and only two said that they lived in a better house prior to settlement. These statistics reflect very accurately the housing policy of the cooperative, and the three to four years which pass before a settler moves into his own permanent dwelling.

Educational facilities at Treze are still very inadequate. In 1970, there were about four hundred children between the age of seven



"Hearth and Home"
Interior of new newly built Settler's House at Trees

and fourteen, but no school houses. However, education has not been ignored. Treze has five teachers who seemed to have been as carefully selected as the settlers. All hold primary school teaching certificates. Classes are held in the homes of settlers and in the meeting hall of the cooperative. Despite these austere conditions, as many as 224 children were enrolled in 1970, and were receiving primary level instruction.

School is not compulsory, and children are not required to wear uniforms and shoes, as is customary in other schools. Absenteeism is still very high. During the prolonged tobacco harvest season, many parents keep their children at home to help with the work. The teachers' attitude is one of tolerance and patience. With the majority of the parents illiterate, the values of education must first be taught. The orientation of parents is considered as important as the schooling of their children. To this end, the teachers hold monthly meetings to which all parents are invited. Parents are encouraged to freely discuss any problems relating to the training and education of their children. Teachers also take turns, working in the evenings, to provide adult literacy training. In 1969, thirty-eight men and women between the age of sixteen and thirty participated in this program. Teachers are paid $1.25 for every student taking this four months course. The teaching method used is that developed by the Brazilian educator Paulo Freire.

Education is paid for out of an education fund which receives fifteen per cent of the cooperative's annual profit. The fund also provides for children who wish to continue their schooling beyond the

the primary level. In 1969, the first four students were enrolled at the Colégio Laudelino Freire, a private school in nearby Lagarto.

Among nineteen respondents with children of school age, twelve or 63.1 per cent found educational opportunities at Treze better than prior to settlement, six indicated that they found no change, and only one felt that opportunities were better where he lived before he came to Treze.

Treze does not have any medical facilities other than a first aid post at the cooperative center. However, settlers are making contributions to a health insurance plan. In emergencies the cooperative provides transportation to the nearest doctor or hospital. Settlers are expected to pay for the fuel expended on such trips. Among twenty-three respondents, nine or 39.1 per cent indicated that conditions for attending to families' health and medical needs are better than prior to settlement, thirteen or 56.5 per cent felt that there has been no change, and one indicated that conditions are worse than in the area where he lived previously.

The cooperative's credit, supply, and marketing system is operated in a business-like manner and functions smoothly and efficiently.

Consumption credit is available to all settlers and members who can demonstrate a legitimate need. Its main purpose however, is to help meet the family needs of new settlers until they become established. It is also available to new associate members who, in joining the cooperative, are required to sever their ties with middle-men, and thus are

deprived of their traditional source of credit. Annual interest rates on this consumption or "subsistence" credit is less than ten per cent.

Other lines of credit are available for the purchase of consumer durables, the construction of homes, for farm improvements, and for the purchase of farm inputs. The amount a member can borrow, interest rates, and other terms, are variable and depend on the proposed use. The first demand made of credit applicants is not to demonstrate their ability to pay back the loan, but to explain its intended use. In the case of production credit for example, the amount a member can borrow is not established on the basis of his previous performance, but rather on the basis of the potential financial benefits of the proposed investment. For this purpose, settlers and other members are required to submit an annual production plan. The plan is reviewed by the cooperative and is subsequently discussed with the farmer, so that any necessary changes may be made. Once approved, the plan becomes the farmer's investment calendar for the production year and also enables the cooperative to provide a minimum amount of guidance and supervision.

Interest rates vary from twelve to eighteen per cent per annum. Low rates apply to all essential farm inputs such as seeds, plant material, fertilizer, pesticides, and tools. The higher rates normally apply to loans made for the purchase of consumer durables, home improvements, etc.

In a promotional effort by the cooperative to encourage the establishment of orange plantations, long term loans have been made available to members with interest rates as low as six per cent per year.

In this particular line of credit, payments on the principal sum are not required until the orchards come into bearing, that is, not until three to four years later.

All essential farm supplies are available at the cooperative center. As much as possible, all farm supplies distributed by the cooperative are bought at the source. The cooperative has its own storage and mixing facilities for fertilizer. Items too bulky to be carried by farmers are delivered to the farm gate for a small fee.

In addition to the farm supply store, the cooperative has a consumer section which sells groceries, dry goods, and various household articles.

The cooperative has a strict rule which forbids members to sell to middle-men. To enable members to live up to such high and uncommon expectations, the cooperative has made good on its equally tough promises to members. It will buy and resell anything members will produce, regardless of the kind of product or the quantity. It will also pay a better price than that offered by any independent buyer.

Tobacco, one of the principal cash crops of settlers, is processed into rope tobacco and stored in two large warehouses. Farmers are paid the same day they deliver the crop. The price they receive is based upon current market prices at the time of delivery. The cooperative usually does not sell until several months later, when prices are more favourable. At that time, members are paid the difference between what they received at harvest time and the price obtained by the cooperative.

Deductions are made for processing, storage, and transportation costs. If the cooperative receives less than what it paid to members, it will absorb the losses.

The cooperative's buying and selling procedures for other products which can be stored are similar. Manioc roots are bought and processed during the harvest season, and the manioc flour is stored in silos until prices are highest. Storage facilities are also available for such crops as beans, corn, and rice. Perishable crops such as oranges, yams, and sweet potatoes, are marketed directly at the various wholesale markets of the large coastal cities such as Recife, Aracaju, and Salvador.

The cooperative's system of keeping settlers' accounts resembles the bank checking account system. Deposits from sales are credited, while purchases from the cooperative, the rental of equipment, and other services are shown and deducted as debits. At the end of every month, each member receives a statement showing the transactions that were made. The statements are uncomplicated, but sufficiently detailed and itemized to allow members to check with their own mental or written record. While some of the settlers interviewed need to get the help of a neighbour or of the staff of the cooperative to read and interpret their monthly statement, none indicated any difficulty in understanding the system or expressed any form of mistrust.

Technical guidance and orientation is provided to settlers and members through the cooperative's own staff, and through a young

agronomist from ANCARSE, the State of Sergipe Rural Extension Service. ANCARSE also is providing a full-time home economist for Treze. With over three hundred settlers (in 1971), and a total membership of 1,300 settlers and small farmers, the cooperative has long outgrown its capacity to provide the level of individual attention and guidance that would be desirable. To cope with this problem, the cooperative, as already noted, is in the process of establishing five farm service centers in adjoining municipalities. This will permit many of the present associate members to obtain assistance in their own area.

In addition to the limited amount of field assistance provided by the cooperative's own staff and by the ANCARSE agent, Treze is also making very effective use of group orientation techniques. This method is also to be extended to the new farm service centers.

Treze's group orientation system was instituted by Francisco Mota and Luiz Alves, and has been in effect since their assignment to the project, in the early part of 1963.

Every Wednesday night, all settlers and associate member are invited to attend a general meeting at the cooperative center. The first part of every meeting is devoted to informal lectures, while the second part is given over to discussion of members' questions. The author was invited to attend one of these assemblies.

The meeting was scheduled to begin at eight o'clock in the evening, but people began arriving as much as a half an hour earlier. They came alone or in small group. The majority were men, but there

were also women and children. The latter went inside the meeting hall and sat down. The men stood around an outside courtyard, talking and laughing, and exchanging the latest stories and gossip.

The people had obviously learned something about time and punctuality. The meeting began at eight O'clock and the hall was already filled to capacity. Approximately 170 people were present. A few late-comers drifted in after the meeting had already begun, and sat on the floor between the aisles.

Francisco Mota took his place behind a small table on an elevated platform. Next to him sat Marinho, the president of the cooperative, and on the other side, the young agronomist from ANCARSE. In an attempt to remain as inconspicuous as possible, the author had taken a seat in the last row of benches. When spotted by the director, who had just opened the meeting, he was asked to come to the platform, and after a brief introduction, was invited to say a few words to the audience. Mota then continued with his talk.

He spoke about his family, and the discussion he had with his children on the dinner table that evening. The point he made was that sharing and caring are important attributes of a good and happy family. His comments seemed very casual, but were far from trivial. As soon as he had finished relating the topic of the discussion he had with his own children, he began to talk about the cooperative and its members. He pointed out that the cooperative was like a family, and that its success would depend on the same attributes which he had described. To develop a strong family, each member was important and was to carry his share of

the burden.

While to most of members of the cooperative, Francisco Mota must seem to be the perfect patrão and the head of this cooperative family he was talking about, his speech left no doubt that he had not cast himself into this role, and that he was bent upon and determined to gradually erode this image of him. Paternalism has little place in his philosophy or that of Luiz Alves. Both men are imbued with an uncommon appreciation of the peasant's feeling and thinking and of his humanity. They exploit to a maximum the peasant's willingness to be led and guided, but with every word and action bring him closer to the point where he can stand and walk alone.

After a few more admonishing remarks about settlers' need to budget their time and money and about the importance of considering production alternatives, he turned to a few short business matters, and turned the meeting over to the agronomist.

The agronomist first talked about the use of fertilizer. His emphasis was upon fertilizer costs, rates of application, timing, and effects upon yields. Like Mota, he was didactic, and constantly used practical examples to illustrate his point. He concluded his discussion on fertilizer with the analogy that plants are like people, undernourished and unproductive if not fed properly. He apologized for having used this example so many times before, but added that the point was worth repeating time and again. He then went on to talk briefly about certain credit arrangements in connection with the further expansion of citrus plantations, and invited interested members to submit planting proposals to him. He

also specified certain days on which he would be available to discuss these plans with each member individually.

The last to address the assembly was Marinho Santos, the president of the cooperative. Marinho, a man in his late twenties, had been president since March of 1969. He had been one of the first settlers who came to Treze. He never had any formal schooling, but had taught himself to read and write, and had proven himself a good farmer as well as a good administrator.

Marinho's address was short. He discussed a few items of cooperative business, and then delivered a brief and stern concluding message. From what he said, it was obvious that he had been around Mota and Luiz Alves for a long time and that he was already thoroughly infected with the same ethic.

It had been a very hot day. The heat in the auditorium was stifling. There was little ventilation. The people were tired. Some of the children who had come along to the meeting, had fallen asleep. Some settlers, perhaps a dozen, had quietly left the hall during the latter part of the meeting. The president showed his displeasure. He reminded the audience of the purpose of these meetings, that they were to bring their problems and questions, in order that everybody would benefit and learn from the discussion. He argued that he and Mota and the agronomist also have families, and also would much rather be at home. He suggested, that the people who leave early are usually the people who come running to the office with their problems the next day, taking up everybody's time.

The discussion which followed, after the president had ended his talk, suggested that his admonition was at least partially justified. There were many questions. One farmer had brought a portion of a blighted yam plant and wanted to know what he could do. One settler wanted to know if he could trade his lot with someone else in order that he could live next to his cousin in one of the newly-divided areas of the project. Another wanted to know more about plans of the cooperative to construct a centrally-located public school, and was concerned that his children would have to walk very far to school every day. The questions and discussions went on for nearly an hour, when the meeting was finally closed. After the meeting, a few settlers still lingered on, too shy to ask questions during the meeting, or burdened with problems they did not wish to discuss in front of the whole group. It was nearly eleven o'clock by the time the last member had departed.

10.3 Agricultural Practices, Activities, and Income

Because of the agricultural background and previous experience of many of the farmers of Treze, their transition to settler status was much more easily achieved than in the case of the plantation workers who became settlers in the other projects. Furthermore, since many of the settlers of Treze came from the immediately surrounding area, there have been fewer disruptions in important ties between families and friends. According to Francisco Mota, this factor has been important in helping families to make an otherwise difficult transition. Mota also explained that many settlers received some help from friends, relatives, and in-

some cases, even from former landlords, in becoming established. To the ex-cane worker, the idea of receiving such help from anyone would be virtually unthinkable. The people he knows are usually too poor or too rich to provide the help he might need. Thus, while the demands made upon the new settler who comes to Treze are rigorous, he does not feel isolated. He knows that he can obtain help, if not from friends or relatives then from the cooperative and often from both. Having the assurance that there is at least a modicum of certainty to his future, he is psychologically prepared to commit himself, to learn, to be guided, and to respond rather rapidly to the opportunities presented to him.

Approximately half of the sample group indicated that they still adhere to the practice of burning the land prior to planting, but often added that they knew it was a bad practice and that they only burn to kill the weeds in preparation of previously fallow land. Twenty-two of the twenty-seven respondents indicated that they use the crop and land rotation system recommended by the ANCARSE agent. The system consists of a three or four year cycle, depending on the quality of the land, in which tobacco is followed by manioc, then beans, and a year of fallow. On better land, the fallow period is omitted. The system is also adopted with other crops. Settlers no longer practice interplanting, even though this procedure is very common throughout the region.

Nineteen or 70.3 per cent of the respondents made use of chemical fertilizers during the 1969 production year. All indicated that they make regular use of insecticides. In 1969, eight of the respondents rented a tractor provided by the cooperative. All had pro-

duction loans in 1969. Amounts borrowed ranged from U.S.$44 to U.S.$600.

The relative importance of the various crops grown by settlers of Treze is illustrated by the following sample statistics:

Crop	No. of Settlers (out of 27)	Area Planted (Hectares) Minimum	Maximum	Average
Tobacco	27	0.3	1.8	0.8
Manioc	25	0.4	1.5	0.7
Beans	23	0.05	0.5	0.2
Coconut	20	0.02	1.0	0.1
Yams	18	0.1	1.0	0.2
Sweet Potatoes	6	0.1	0.4	0.2
Corn	4	0.3	0.5	0.4

Tobacco is the most important cash crop, and is grown on a regular basis by most settlers. Almost equally important is manioc, which is grown as a cash crop and also as a staple for family consumption. The planting of orange orchards, as pointed out earlier, is the result of promotional efforts over the past four years. Few of the trees have reached the productive stage. The cooperative hopes that each settler will eventually have two to three hectares planted to oranges. Coconut palms were introduced several years ago on an experimental basis. While as many as twenty of the settlers in the sample reported coconut, most have fewer than twenty trees, and the palms are still immature. Yams are important for family consumption as well as for sale. Because of the crop's sensitivity

to blight and other diseases, settlers are somewhat reluctant to expand their production of this normally very profitable cash crop. Beans and corn are mostly grown for family consumption, and are far less important than in the surrounding region.

One of the noteworthy production and land use features of the small farms of Treze is the fact that few farms have more than 2.5 hectares of land planted to crops. Except for the Japanese farmers at Rio Bonito, the settlers of Treze spend more than twice as much in farm inputs, other than labour, per hectare of cropland than in any of the other projects. This is reflected in gross values of production per hectare exceeding U.S.$300, which is fifty per cent higher than in most other projects.

An approximation of the income position of what might be a representative farm of Treze, is shown in Table 8. On the basis of prices paid by the cooperative in the early part of 1970, a settler who, in 1969 planted the crops and the respective areas indicated in this table, and who sold his entire crop to the cooperative, should have achieved a gross income of U.S.$816. With an average expenditure of U.S.$206 (based upon sample data) and a total labour input by the family of 294 man/days, the settler would have average returns to family labour of U.S.$2.07 per man/day. If in the future, each farmer will have two hectares of land devoted to orange production, and if it is assumed that in addition, existing production patterns are retained, returns to family labour can be expected to exceed U.S.$3.00 per man/day.

Sample values show considerably lower annual gross incomes for

APPROXIMATION OF POTENTIAL INCOME POSITION

SETTLER OF TREZE

Product	Average Area Planted ha.	Average Yields per ha.	Total Production	Average Product Price $	Total Value of Production $	Total Labour Required Man/Days
Tobacco	0.8	760 Kg	608Kg	0.64/Kg	$ 390	152
Manioc	0.7	8,000 Kg	5,600Kg	-		84
Manioc Flour	-	-	1,866Kg	0.17/Kg	317	-
Oranges	0.6	not producing	-	-	-	24
Yams	0.2	5,500	1,100	0.08/Kg	88	20
Beans	0.2	590	118	0.18/Kg	21	14
Total	2.5				$ 816	294

Potential Annual Gross Income U.S.$ 816

- Estimated Total Expenditures U.S.$206 206

Potential Net Income U.S.$ 610

Total Family Labour 294 Man/Days

Estimated Average Returns to Family Labour 610/294 U.S.$ 2.07 Man/Day

Average Annual Gross Income of Sample U.S.$ 397, Minimum U.S.$ 57, Maximum U.S.$1,117

Proportion of Settlers in Sample with Annual Gross Income Less than U.S.$1,500: 100%

- Based upon sample data.

1969 than the average suggested by the approximation. As many as fourteen respondents or 51.9 per cent were found to have annual gross incomes of less than U.S.$300. Nine settlers, representing 33.3 per cent, had incomes of U.S.$300 to $600, three or 11.1 per cent obtained incomes of U.S.$600 to $900, and one settler obtained an income of U.S.$1,117, which was the maximum for the sample.

Three important reasons account for the difference between the value obtained in the approximation and the average value obtained from the sample group. First, approximately U.S.$100 need to be deducted from the gross income value of the approximation, to account for the consumption by the family of yams, manioc flour and beans. A second factor, which is more critical, was the late beginning and irregularity of the 1969 rainy season, which resulted in somewhat lower yields than those obtained in previous years and in 1970. Finally, the prices used to derive the approximation represent the total per unit price the cooperative expects to have paid after it has marketed settlers' 1969 production of tobacco and manioc flour, whereas the gross income values of the sample group were computed on the basis of the usually somewhat lower prices settlers receive at the time they sell their crop to the cooperative.

Livestock production at Treze is not significant. In most parts of the project, the land is not suited for the establishment of good pastures. However, the cooperative has plans for the introduction of livestock on its recently acquired *fazenda*, which has several extensive tracts of valley land. The land is to be distributed to new settlers in

lots sufficient in size to allow the establishment of suitable crop and livestock combinations. Poultry production is carried out on an experimental basis, and may offer some possibilities for diversification.

10.4 Conclusion

The very considerable success of the Colony and Cooperative of Treze raises many questions about the traditional approach to land settlement and about the specific inputs and procedure that are prerequisite to success.

Treze did not have the benefit of a formal plan. The original objectives for the establishment of the project were at best questionable. Except for topography, site characteristics are not favourable. The soils of Treze are poor and, without the use of fertilizer, generally unproductive. The previous owner of the property went bankrupt growing sisal. Rainfall is less reliable than in areas closer to the coast. The situation is further aggravated by the excessive drainage and high permeability of the soils. The project is thirteen kilometers from the nearest market town and sixty-six kilometers from the wholesale markets of the state capital.

Despite these disadvantages, Treze is without question the most successful settlement project in the Northeast which has an all-Brazilian composition of settlers. To the author's best knowledge, the Cooperative of Treze is also the most successful all-Brazilian farmers cooperative in Brazil.

The success of Treze is no enigma. Backed by the Bank of Brazil, the project was assured a reliable source of funds. Except for the original group of settlers, all candidates for settlement, after the Bank took over, were carefully selected. The majority of the settlers had an agricultural background either as independent farmers, or as renters, sharecroppers, or agricultural workers. The effects of dislocation and the disruption of important ties were minimized by selecting families from the surrounding municipalities.

An effective marketing system was established. This allowed settlers to market all of their product. Crops were adopted which were well-suited for the ecological conditions of the region. Settlers were encouraged to achieve greater self-sufficiency in producing their own food. Vegetables were introduced to help families have a more balanced diet. The wasteful and very costly procedure of processing manioc by hand labour was discouraged by providing completely mechanical facilities. All essential farm inputs were made available. Various lines of production credit were provided, with loans based upon farmers' potential production rather than upon earnings of the previous year. A moderate amount of production orientation was provided. Settlers were taught the value of money and its alternative uses. They were encouraged to aspire to certain material goals which were attainable and within their reach through their own efforts. In all dealings with settlers, simple but precise directives were employed which allowed them to know exactly where they stand and what was expected of them.

Above all, the project was blessed with visionary and far-sighted leadership, stressing the dignity of the peasant, and imbued with a compassionate and unerring belief in his capacity for growth and self-betterment.

PROJECT SUMMARY

TREZE

AGENCY: Cooperativa Mista dos Agricultores do Treze
LOCATION: Municipality of Lagarto, Sergipe
DATE ESTABLISHED: 1961, by Private Interests
COST ESTIMATE: Not sufficient data
FUNDING: Bank of Brazil, Bank of the Northeast, SUDENE

TYPE OF SETTLEMENT:
Size: 3,340 hectares
Layout: Nucleated
Tenure: Title after full payment
Number of Lots: 420
Number occupied: 270 (1970)
Lot Size: 8 hectares

PHYSIOGRAPHY:
Mean Annual Rainfall: 1,200 mm
Mean Annual Temp.: 24.2°C
Wet Season: March to August
Dry Season: Sept. to Feb.
Topography: Flat upland, some shallow, and broad valleys.
Soils: Sands, sandy clays of the tabuleiro type

ECONOMIC DATA:
Principal Crops: Tobacco, Manioc, Yams, Oranges
Livestock: Poorly developed
Services: Marketing of all crops, credit, technical assistance, important farm inputs, mechanical equipment.
Settler Incomes: Average Annual Gross Income (1969) U.S.$397
Range U.S.$57 to $1,117
Estimated Average Value of Production per ha. of land in crops: U.S.$326
Estimated Average Returns to Family Labour: U.S.$2.07 per Man/Day

SOCIAL DATA:
Average Family Size: 6.7
Average Age of Settler: 44.5
Services: Primary Education, Fund for Secondary Education, Adult Literacy Training, Social Orientation, Health Insurance Plan.
Total Number of Families: 270 (1970)

XI

EVALUATION OF ACHIEVEMENTS

11.1 Settlement Objectives

The purpose of this chapter is to provide an evaluation and summary of the achievements of settlements in relation to the principal social and economic objectives of colonization outlined in Chapter Four. These were as follows:

1. To improve the level of living, housing, health, and education of the settler and his family, and to provide the opportunities and conditions necessary for his own progress.
2. To firmly attach man to the land.
3. To promote the rational exploitation of land resources.
4. To contribute to regional economic growth.

It was suggested that the first of these objectives was the most crucial one, and that the realization of all other objectives would be contingent upon it. Implicit in all of these goals is the achievement of a level of income sufficient for the beneficiary to provide for his family, to purchase goods and services, to save, and to pay off the investment made on his behalf. Within the project, the settler is to find the productive resources and the organization of markets which will allow him to attain the required income. The project is also to provide a basis for technical guidance and for civic and social development. Over a period of ten to fifteen years, settlers are to become independent small-holders, organized into a cooperative and capable of administering

the project which will have been emancipated.

11.2 Objective One: Levels of Living and Income

Precise quantitative measurement of improvements in levels of living attributable to colonization is not possible without adequate information about the income and capital position and the general social situation of settlers before and after settlement. While such detailed information could not be obtained, settlers were asked to compare their situation before and after settlement.

The following questions were asked:

1. Do you find it easier now or more difficult to feed and clothe your family?
2. Are educational opportunities for your children better now or worse than prior to settlement?
3. Are health services for yourself and your family better now or worse than prior to settlement?
4. Is the house you live in better or worse than the one you lived in prior to settlement?

The results of this inquiry are summarized in Table 9.

Ability to Feed and Clothe the Family

While various factors unrelated to the settlement process can affect the peasant's level of living, it is generally assumed that directed land redistribution and colonization will or ought to result in substantial improvements in the material and income position of settlers. Such improvements should be clearly reflected in the ease with which the settler can provide life's most basic necessities of food and clothing for himself and his family. Since his ability to meet basic needs is almost exclusively dependent upon his own productive efforts and income, it is also one of the

TABLE 9

SITUATION OF FAMILIES BEFORE AND AFTER SETTLEMENT

(percentage of respondents in each category)

1. Feeding and Clothing the Family

Response	CAM N=7	CAB N=31	VIT N=5	TIR N=27	BON N=6	PIN N=33	TRE N=23	ALL N=132
Better Now	43	55	100	63	67	33	48	52
Better Before	-	26	-	19	17	43	22	25
No Change	57	19	-	18	16	24	30	23

2. Education

Response	CAM N=8	CAB N=28	VIT N=4	TIR N=23	BON N=5	PIN N=29	TRE N=19	ALL N=116
Better Now	71	68	100	74	40	86	63	73
Better Before	-	14	-	9	20	10	5	10
No Change	30	18	-	17	40	4	32	17

3. Health Services

Response	CAM N=7	CAB N=29	VIT N=6	TIR N=26	BON N=5	PIN N=31	TRE N=23	ALL N=127
Better Now	57	48	83	54	80	87	39	61
Better Before	43	24	-	42	-	10	4	19
No Change	-	28	17	4	20	3	57	20

4. Housing

Response	CAM N=9	CAB N=32	VIT N=6	TIR N=29	BON N=7	PIN N=42	TRE N=27	ALL N=152
Better Now	78	72	100	76	43	67	82	73
Better Before	22	19	-	7	28	21	7	15
No Change	-	9	-	17	29	12	11	12

N= Number of Respondents.
CAM = Cametatuba
CAB = CRC Cabo
VIT = CRC Vitoria
TIR = Tiriri
BON= Rio Bonito
PIN= Pindorama
TRE= Treze
ALL= All projects.

most direct indicators of the results of settlement efforts.

The results summarized in Table 9 suggest that improvements in settlers' income position and in their ability to provide for basic family needs cannot be taken for granted. Of a total of 132 respondents only 52 percent or roughly half indicated that they now find it easier to feed and clothe their families. By contrast, improvements in education, health services and housing which,for the most part, are attributable to the investments made by settlement agencies, were reported by 73, 61 and 73 percent of the sample group for all projects.

Cross tabulation did not reveal a significant relationship between settlers' present gross income and their evaluation of their present material position relative to their situation prior to settlement. On the other hand, a very consistent pattern was evident between settlers' activities and employment prior to settlement and their assessment of their position at the time of the interview.

The data presented in the following table indicate that landless agricultural workers had more to gain in becoming settlers than individuals who previously were independent farmers, renters, or sharecroppers, or who did not work in agriculture.

Ability to feed and clothe Family	Occupation prior to Settlement: Self-Employed N = 50	Agric. Workers N = 54	Non-Ag. Workers N = 28
Better Now	42.0%	72.2%	28.6%
Better Before	30.0	13.0	39.3
No Change	28.0	14.8	32.1
	100.0%	100.0%	100.0%

Thus, on a percentage basis, out of a hundred former agricultural workers, seventy-two find it easier now to provide for their families, while for the same number, only forty-two ex-farmers and twenty-nine settlers with a non-agricultural background have experienced such improvement.

These data show that improvements in settler's ability to feed and clothe their families are most frequent among previously land-less rural workers, and least frequent among non-agricultural workers who became settlers and among former independent farmers, renters, and share-croppers. From the foregone one may conclude that although settlement does not guarantee automatic improvements in the levels of living of all settlers, the ownership and productive use of agricultural land is the basis of improvements which ought to distinguish land-less rural workers from settlers and small farmers in their respective levels of living.

The observation that among a sample of fifty previously self-employed farmers as many as twenty-nine or 58 percent experienced no improvements or found it easier to provide for their families prior to settlement, suggests that, by and large, settlements have not been successful in providing relevant farm services of a level very much superior to those available to independent farmers outside of projects.

Education, Health Services, and Housing

Directives concerning primary school education, health services and housing have been and continue to be fundamental aspects of Brazilian legislation governing planned land settlement projects. While there has been considerable flexibility in the interpretation of these legal provisions.

it is evident from the previous description of individual projects, that these generally received greater attention than provisions designed to assure settlers' rapid progress toward economic self-sufficiency and independence. It was noted that, with the exception of Treze and Tiriri, houses were constructed for most of the original families that were settled. Adequate physical facilities for primary education were constructed in all projects except Treze, and in all seven projects arrangements were made to assure settlers access to a minimum of basic health services.

The attention given to education, health services, and housing is reflected in settlers' testimonies about the improvements they have experienced in these areas as a result of settlement (Table 9). Improvements have been most marked in the area of primary education and housing, with 73 percent of all respondents on both questions reporting better conditions than prior to settlement.

In most settlements, conditions for primary education are still characterized by such problems as high drop-out rates, poor attendance, poor pay for teachers, and lack of funds for books, equipment, and school supplies. Nevertheless, if assessed in the light of conditions existing in many of the rural areas from which settlers originated, the existence within projects of a functioning system of primary education must be considered a significant improvement. The arrangements which exist for high school education at the Rio Bonito and Treze project, for vocational training at Pindorama, and for adult education at Treze, Pindorama, and Tiriri are also noteworthy and further set these projects apart in relation to conditions which exist in other rural areas of the Northeast.

Improvements experienced by settlers in housing conditions are consistent with the generally liberal housing policies that were followed in the establishment of most projects. A significant relationship was found between settlers' assessment of their present housing situation and their previous status. Of a total of 54 settlers who previously were agricultural workers, 48 or approximately 90 percent lived in houses provided by their landlords, while among 78 settlers who previously were independent farmers, renters, or sharecroppers, or who did not work in agriculture, only 19 or 24 percent were dependent in the same manner. Of the former group, 96 percent indicated improvements in housing conditions as a result of settlement as compared to only 64 per cent of settlers of the latter group. Again, it is evident that the improvements experienced by settlers are relative to their former position, and that the landless rural workers were the principal beneficiaries of the settlement process.

Health Services available to settlers still leave much to be desired. With the exception of Pindorama, which has its own health centers and a full-time public health staff, settlements depend upon the services available in the nearest town or, in some cases, upon occasional visits by a doctor or a dentist. As settlers are required to contribute to the national social insurance plan (INPS), they are entitled to the same quality of health service as is available to urban families. However, because of distance and difficulties of transport, most families will only seek medical attention in the event of serious illness or in emergencies. It was found that settlers' dissatisfaction with health services related almost entirely to the fact that such services are not locally available.

On the other hand, many settlers acknowledged the fact that now they do have access to doctors, dentists, and hospitals, while previously they had to pay for such services themselves out of their meager earnings or to depend upon the mercy and good will of their landlords. In most settlements, families have also received some basic orientation in nutrition, sanitary practices, and preventive health care. Until very recently, opportunities for such orientation in other rural areas were virtually non-existent.

In summary, observations made in this study, a comparison between conditions within projects and other rural areas, and the testimonies provided by settlers clearly indicate that settlement has resulted in improvements in the area of education, health services, and housing for the majority of settler families. While these improvements may seem very modest, to the previously disenfranchised and landless rural worker they are significant.

Levels of Income

In chapter four, it was suggested that the average settler family, composed of two adults and five children would require an annual gross income of approximately U.S. $1,508 to maintain an adequate diet, to provide for family and farm expenditures, to pay off property debts, and to permit a moderate amount of savings. From the discussion of the seven projects in chapter five to ten, it is evident that the majority of settlers do not achieve this level of income.

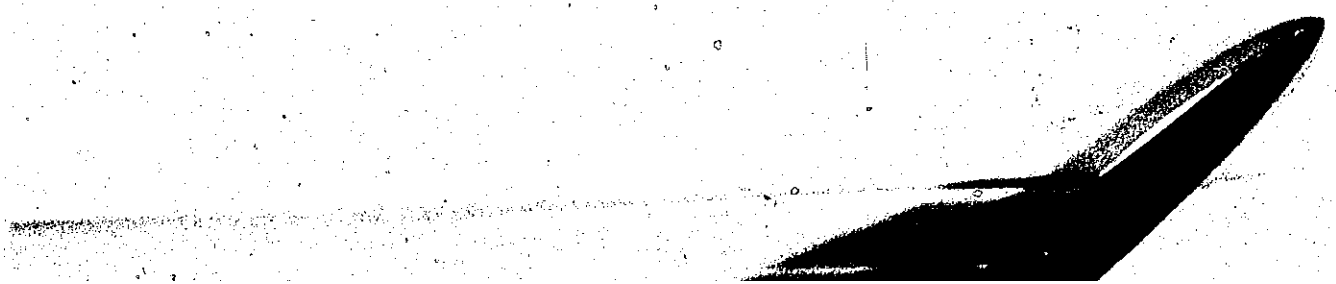
In 1969, 76.3 percent of a total sample population of 152 settlers in seven projects had gross incomes of less than U.S. $600; 17.1 percent

TABLE 10

PERCENTAGE DISTRIBUTION OF 1969 ANNUAL GROSS INCOME
(U.S. Dollar Equivalent)

152 SAMPLE FARMS - SEVEN PROJECTS

	N	INCOME GROUPS U.S.$									AVERAGE MINIMUM MAXIMUM U.S.$
		0 - 299	300 - 599	600 - 899	900 - 1,199	1,200 - 1,499	1,500 - 1,799	1,800 - 2,099	2,100 - 2,399	Over 2,400	
CAMARATUBA	9	6 66.7%	3 33.3%								268 142 466
CABO	32	10 31.3%	12 37.5%	3 9.4%	4 12.5%	1 3.1%	1 3.1%			1 3.1%	674 67 3,889
VITORIA	6	3 50.0%	2 33.3%						1 16.7%		630 171 2,088
TIRIRI	29	8 27.5%	11 37.9%	4 13.7%	1 3.5%		1 3.5%	1 3.5%	2 6.9%	1 3.5%	769 22 4,168
SONITO	7	2 28.6%	3 42.8%		1 14.3%					1 14.3%	1,077 246 5,000
PINDORAMA	42	26 61.9%	7 16.6%	6 14.3%	1 2.4%	1 2.4%		1 2.4%			420 44 1,875
TREZE	27	14 51.9%	9 33.3%	3 11.1%	1 3.7%						397 57 1,117
Total	152	69 45.4%	47 30.9%	16 10.5%	8 5.3%	2 1.3%	2 1.3%	2 1.3%	3 2.0%	3 2.0%	565 22 5,000



had incomes of $600 to $1,500 and only 6.6 percent achieved incomes larger than the suggested minimum of $1,500 (Table 10). The average for the entire sample was only U.S. $565.

This data tends to be consistent with the observation made earlier that the incidence of improvements in levels of living experienced by settlers is lowest in the category in which it ought to be highest. Nearly fifty percent of respondents indicated that there has been no change in their ability to feed and clothe their families or that they now find it more difficult to do so. In the light of the income pattern summarized in Table 10, this observation is not surprising. Given an annual gross income of less than U.S. $600 for 75 percent of settlers, an estimated annual net income of less than $500 and an average family size of seven, the annual per capita income of the average settler family is well below U.S. $100. If these figures are compared with the annual salary in force in 1969, of approximately U.S. $320, and if the labour force of the average rural family is estimated at 1.5 to 2.0 man/years, it becomes evident that the income position of the majority of settlers does not differ significantly from that of other rural workers.

Under Brazilian labour legislation, the rural worker is entitled to receive from his landlord the minimum salary established by federal decree and revised annually, housing, and access to a small subsistence parcel. By comparison, the settler in the typical project normally enjoys security of tenure, an opportunity to own his house and land, conditions which should permit an annual income equal to the minimum salary in force, partial self-sufficiency in meeting his family's food requirements, and the benefits of education and health services.

While under favourable conditions the potential income of settlers should be considerably higher than that of landless rural workers, the fact that the majority of settlers have difficulty in achieving forty percent of the proposed minimum annual gross income of U.S. $1,500 suggests that one of the most critical objectives of land settlement remains largely unfulfilled. The adoption of better production and marketing methods and the introduction of crop combinations which make more effective use of labour, could lead to substantial improvement in settlers' income position. However, given the present conditions found in most of the projects, it would be a hasty conclusion to assume that it is merely a question of time before the majority of settlers have attained the suggested level of income. The author believes that the income problem described here does not reflect a lack of adjustment to existing opportunities but rather, in most cases, a lack of opportunities beyond those already exploited by settlers. In other words, it is suggested that the conditions existing in most projects do not permit settlers to achieve significant improvements in their income position, furthermore, that the factors which would permit such improvements are not normally within the control of settlers. This argument will be further examined in the following chapter.

11.3 Objective Two: To Firmly Attach Man to the Land

One of the recurring themes in Brazilian writings about agrarian reform, is the need to firmly attach (fixar) man to the land. Because of the massive migrations of landless rural workers characteristic of many parts of the Northeast, this objective continues to be one of the important justifications for the establishment of settlement projects.

It is obvious that this objective will not be met if the conditions prevailing within the settlement are not convincingly more attractive than those in the surrounding rural areas or those in the cities. In becoming a settler, the new farmer enjoys certain privileges and advantages which he may not have had before. However, these he must weigh against his loss of liberty, his new obligations, his uncertainties, and his need to give up his patron for a group of impersonal and often indifferent strangers who are to manage his affairs. If in addition economic opportunities are very limited, becoming a settler may hold relatively few attractions.

The author estimates that, with the exception of Trexe, the turnover rate among settlers during the first five years in the life of each project has been in the order of forty to sixty percent. This, it would seem,is too high a failure rate to argue convincingly that the projects examined have met the objective of firmly attaching man to the land.

11.4 Objective Three: To Promote the Rational Exploitation of Land Resources

Within the context of Brazil's agrarian reform law of 1964, the term "rational", when used to describe the utilization of land resources, generally implies intensity of use. It is measured in terms of returns per unit of land, with due consideration given to variations in land capability, distance to markets, and several other factors.

In the case of colonization projects, rational land resource use generally implies that a certain percentage of land on every lot is devoted to crops, that recommended crop combinations are adopted, and that settlers adhere to recommended farm practices. If projects are assessed in the

light of these criteria and on the basis of the expectations of the founding agencies, the objective of rational land resource exploitation has not been achieved.

In most projects it was assumed that within three to four years from the date of settlement, each farmer would have sixty to eighty percent of his total area planted to annual or perennial crops. The reader will recall that in the case of the two CRC projects, Cabo and Vitoria, settlers were expected to have eight hectares of land planted to crops by the end of their third year. In reality, the average area planted by settlers in each of the two projects, after more than nine years, is only little over five hectares. In all of the other projects, the percentage of land devoted to crops, relative to the total size of lots is even lower, as is evident from the following table.

	CAM	CAB	VIT	TIR	BON	PIN	TRE	ALL
Average Lot Size (ha)	10	10	10	10	25	25	8	14
Percentage of Land in Crops	26	54	51	47	12	20	27	34

In virtually all projects some guidelines were established specifying the types of crops settlers were expected to grow. At Cabo and Vitoria, the planting of sugar cane was prohibited. At Tiriri, sugar cane was to be the exclusive cash crop. At Pindorama, credit was tied to specific crops the cooperative wished to promote. Despite these attempts to rationalize land use and production, settlers have shown a strong inclination to

plant the crops with which they are most familiar, and which they are assured of selling. As was shown in previous discussions, these are not always the crops envisaged in the original plan or those promoted by the settlement agency.

In a further effort to establish a rational system of farming and of resource use, settlement agencies sought to introduce a variety of improved farming practices. Settlers were to learn how to plant along contours on sloping land. They were to abandon their traditional practice of burning the land prior to planting. They were to learn how to use fertilizers, insecticides, and fungicides. They were to practice crop rotation on a systematic basis, and to make use of soil-restoring crops such as legumes and grasses. Inconsistencies in, and often lack of sufficient orientation provided to settlers, the exigencies of meeting family needs, and in some cases of survival, and the additional costs involved in the adoption of recommended practices and of farm inputs, have all but frustrated the realization of these plans.

On the other hand, if settlers' resource use is assessed in the light of the conditions and opportunities existing in projects, it would be difficult to argue that what they do is inefficient, wasteful and irrational. They normally cultivate as much land as their limited labour resources permit; they grow the crops which they need to feed themselves and those which they can sell, and they use farming techniques, traditional or otherwise, for which they can find reason and justification.

11.5 Objective Four: To Contribute to Regional Economic Growth

Settlements were to contribute to regional economic development

and growth in a number of ways. Taxes paid by settlers were to contribute to municipal, state, and federal revenues, and in turn to the funding of public projects and services. Colonization was to enhance the settler's income position and his ability to purchase goods and services, and to reinvest in the improvement of his property. From projects designated as "greenbelt colonies", significant contributions to the urban food supply were expected. Finally, some linkage effects with small agro-industries, both on the supply and demand side, were anticipated.

For obvious reasons, the contribution of settlements to the regional economy is dependent upon their performance and the performance of settlers. While levels of economic performance are considerably below expectations, a positive contribution is beyond dispute.

Settlers are not taxed directly. Except for a few of the Japanese settlers of Rio Bonito, their incomes are so low that they are exempt from federal income tax. However, virtually all industrial crops, that is, crops which are processed, such as sugar cane, passion fruit, tobacco, and in many cases manioc, are subject to a state circulation tax of 15 to 20 percent on the gross value of the product. Tax rates and the products that are taxed vary somewhat from state to state. In the case of sugar cane, the state tax is collected directly from the sugar mills. In the case of all other crops subject to taxation, the tax is collected either from the cooperative if it does its own marketing (eg. Pindorama and Treze) or from the buyers and middlemen. The price paid to settlers and producers, invariably is the net price.

No accurate figures could be obtained about the total amount of circulation tax attributable to settlers' production. However, the

author estimates that the total direct and indirect contribution of all seven projects for the 1969/70 production year was well in excess of U.S. $100,000.

Settlers' consumer buying power, while relatively small, cannot be dismissed as insignificant. If data on incomes and expenditures for all settlers in the seven projects are extrapolated from sample data, the following results are obtained: Total gross revenue obtained by and paid to settlers in 1969/70 was equal to U.S. $858,800. Of this amount, an estimated U.S. $193,040 was spent on fertilizers, insecticides, seeds, plant material small tools, the rental of equipment, and other farm inputs. An additional U.S. $106,400 was spent to pay moradores and salaried workers employed by settlers. Of a total net revenue of U.S. $559,360 or approximately U.S. $368 per family, an estimated sixty to seventy percent was spent on the purchase of food items which settlers do not produce themselves, while the remainder went for other family expenditures, payments on the land, and in some cases investments in farm improvements or savings.

The contribution of settlement projects to the food supply of the large coastal capitals, relative to the total demand, is very limited. In all of these centers, significant proportions of food products which could be grown locally, still need to be imported from other regions. As was noted in previous chapters, the principal cash crops of settlers are not rice, beans, yams, corn, or vegetable, but sugar cane, passion fruit, coconuts, and tobacco. Thus, there is no significant impact upon urban food prices. A possible exception is the influence of the production of the Japanese settlers of Rio Bonito, which on several occasions has affected vegetable wholesale prices in Recife.

The linkage effects attributable to the production activities of settlements, are probably very small and could not be estimated. The case of Pindorama provides some clues. There, the ratio of non-agricultural workers and of service personnel to regular settlers is roughly one to two. However, the situation is probably somewhat distorted by the massive support the project has been receiving from external sources.

From the evidence cited here, it is apparent that settlers are not the exclusive beneficiaries of colonization, and that, as a direct result of their productive efforts, a contribution is made to the regional and national economy. The author would suggest, however, that similar economic results could have been achieved with fewer and more judicious investments than those that were evident in most of the projects that were discussed.

11.6 Summary and Conclusion

Settlements were to achieve the objectives of improving the level of living of settlers, of firmly attaching man to the land, of promoting the rational exploitation of land resources and of contributing to regional economic development and growth.

An assessment of changes in levels of living attributable to settlement was made on the basis of improvements experienced by settlers in their income position, in their ability to meet basic needs of food and clothing, in education and health services, and in housing conditions.

Interview results show that 73 percent of settlers in the sample group experienced improvements in housing conditions and in educational opportunities for their children as a result of settlement, while

improvements in health services were reported by 61 percent of the sample group.

Improvements in settlers' ability to meet the basic needs of food and clothing for themselves and their families were reported by only 52 percent of respondents of the sample group. Improvements were reported most frequently among previously landless rural workers.

It was found that 76 percent of the sample group achieved annual gross incomes of less than U.S. $600, placing the majority of settlers into an income category which is more or less comparable to that of the fully employed landless rural worker earning the legal minimum salary. These low incomes are consistent with and tend to explain the relatively low percentage of settlers who have experienced improvements in their ability to meet basic family needs. While the precarious income position of the majority of settlers leads to the conclusion that one of the most critical objectives of land settlement has not been achieved, the argument that opportunities existing in most projects do not permit significant improvements in settlers' income position is proposed for further examination.

It was suggested that achievement of the second objective of land settlement of firmly attaching man to the land would depend upon conditions within settlements which are convincingly more attractive than those found in the surrounding rural areas or in towns and cities. While offers of land, housing, health and educational services have never failed in attracting a far larger number of settler candidates than projects could accomodate, hardship and unfulfilled expectations among those who were selected resulted in high failure rates in virtually all projects. The observations of this

study do not permit the conclusion that land settlement has been an effective instrument in providing more than tenuous roots to rural workers.

Settlements have fallen far short in meeting the expectations of planners for the rational exploitation of land resources. From the discussion in previous chapters, however, it is also apparent that most projects have failed to offer conditions which would have permitted settlers to develop a more effective system of land utilization. It was suggested that in the light of existing conditions, settlers' use of available resources could not be considered as being irrational and wasteful. One may also add that the settlement project which brought into use previously unused or poorly used agricultural land, has contributed toward the rationalization of use of the land resource in question.

Estimated investments made in the projects under consideration have ranged from as little as U.S. $2500 per family for projects such as Camaratuba and Treze to as much as U.S. $10,000 for Pindorama. The general aim inherent in most settlement programs, that settlers will eventually pay back the bulk of the investment made on their behalf assumes that settlers will have the capacity to do so and that returns will be proportionate to the investments that are made. These assumptions are challenged by the findings of this study. No meaningful relationship could be found between project investments on the one hand and settler's income on the other. With the majority of settlers unable to attain even half of the suggested annual minimum gross income, all evidence that they would be able to meet the financial obligation implied by the investments made on their behalf is to the contrary. These observations permit only one conclusion, - that settlements have failed to contribute to regional economic development

in the manner expected. As before, this conclusion requires the qualification that the contribution made by settlers is nevertheless significant if assessed in the light of the opportunities and conditions that prevailed.

The general conclusion emerging from this evaluation is that although there is evidence of some progress toward the achievement of the four critical settlement goals, by and large, projects have fallen considerably short of meeting the high hopes and expectations under which they were established. The suggestion made earlier that settlements do not offer the conditions necessary to permit significant improvements in the economic performance and income position of settlers, and therefore, in achieving the most critical of the four objectives, implies that either the expectations under which most settlements were established were unrealistic or that the conditions required for their realization could not be met. These propositions will be the subject of analysis of the following chapter.

XII

ECONOMIC OBJECTIVES AND CONSTRAINTS

12.1 Project Costs and Income Targets

To be justifiable, even the least costly of settlement ventures would have to offer opportunities and conditions which would assure the settler and his family a level of living at least equal to or higher than that enjoyed by the salaried rural worker.

Given the minimum wage in force in 1969, of approximately U.S. $320 per year, and assuming an average family labour force of 1.8 man/years, the potential disposable annual income of a rural family would be equal to U.S. $576. In addition to the minimum wage, the fully employed rural worker is also entitled to free housing and the use of a small parcel of land for the production of subsistence crops. Thus, to enjoy a level of living comparable to that of the rural worker family, the settler family would have to earn a disposable annual income of at least U.S. $576.

If investments made on behalf of settlers are taken into account, and if a minimum investment of approximately U.S. $2500 per family is assumed for land, housing, and the construction of access roads, the annual liability per family over a ten year period would be U.S. $250, increasing the annual required net income to U.S. $826. If no outside labour is contracted by the settler family, the minimum cash operating capital required for seeds, plant material, hand tools, and insecticides, estimated at 20 percent of gross income, would be equal to $\left(\frac{826 \times 20}{80}\right)$ U.S. $206.50.

Thus, to guarantee a disposable income of U.S. $576, or an amount equal to the income potential of the family of the salaried rural workers, the settler family would have to obtain a minimum annual gross income of U.S. $1032.50. At this level, the settler and worker family would be at a par in their income position and levels of living, with the only difference being that the settler, after ten years, would own his property and would have acquired a net worth of U.S. $2,500 if no appreciation in the value of his property were to take place.

Given an annual gross income of U.S. $1032, the settler family would not realize any significant savings except for gains in net worth through property payments. Capital expenditures for farm improvements would not be possible. Obtaining production or consumption credit would be very difficult. For the first ten years after settlement, no significant improvements would be possible in the level of living of the settler family over and above that enjoyed by the rural worker. The settler's permanence in the project would depend upon advantages enjoyed in the project and not available elsewhere. In short, except for the promise of eventual landownership and independence, settlement would hold relatively few attractions.

If the foregone calculation is extended to the seven projects considered by this study, and if settlers were actually to be held responsible for basic project costs, as anticipated in most project proposals, it becomes evident that in all cases, settlers would require annual gross incomes in excess of U.S. $1,000 to assure a disposable income equal to that of salaried rural workers.

The following table shows an approximation of basic project

investments[1] and of minimum annual gross incomes that would be required in each case to assure settlers a minimum disposable income of U.S. $576 and to permit the required property payments.

	CAM	CAR	VIT	TIR	BON	PIN	PRE
Approximate Investment per Family U.S. $	3,500	3,100	3,700	3,100	4,000	7,000	3,000
Minimum Net Income U.S. $	576	576	576	576	576	576	576
Property Payments U.S. $	350	310	370	310	400	700	300
Operating Expenditures U.S. $	231	221	236	221	244	319	219
Minimum Annual Gross Income Required U.S. $	1,157	1,107	1,182	1,107	1,220	1,595	1,095
Actual Average Gross Income Sample Group 1969 U.S. $	268	674	630	769	1,077	420	397

[1]Estimates include the cost of land, construction of houses, schools, main buildings, roads, and basic equipment. The costs of administration and of services are not included. Approximation is based upon minimum investment that would be required if projects had been established in 1969.

Since one of the principal objectives of land settlement is to provide rural families with opportunities which will assure their social and economic progress and better living conditions than those they have left behind, it is clear that their disposable incomes must exceed their potential earnings as salaried workers. Higher incomes are implied by the objective of obtaining a higher level of living and hence by increased family expenditures. Higher incomes in turn imply increased farm operating expenditures as well as investments in farm improvements. Therefore, the annual gross income of U.S. $1,508 suggested by the income model outlined in Chapter IV, represents, for most farms, the minimum annual gross income necessary to achieve the desired objectives. Is this income target realistic and attainable under conditions of traditional agriculture?

12.2 Potential Farm Income

An assessment of the actual and potential income position of settlers has already been made in the study of each of the seven projects in question. Potential annual gross income was calculated on the basis of representative crop combinations and areas planted by farmers in each project, and on the assumption that farmers obtain average to good yields, are paid official product prices, and that their entire production is sold. The results are summarized in the following table:

	CAM	CAB	VIT	TIR	BON	PIN	TRE
Total Value of Production(1969) U.S. $	560	1,116	1,213	1,027	3,190* 740	1,157	816
Average Area in Crops (Ha)	2.6	5.4	5.1	4.7	3.7 2.9*	5.4	2.5
Value of Prod. per Ha of Land in Crops U.S. $	216	206	238	218	200 1,100	214	326

*Japanese Settlers

While settlers' annual gross income would be equal to the total value of crops produced only if the entire production were sold, in virtually all cases a deduction of at least U.S. $150 must be made for production that is not sold but consumed by the family. Given the above returns to land and areas under cultivation it is clear that the suggested annual gross income of U.S. $1,508 is unattainable for all but the Japanese settlers producing fruit and vegetable crops.

In all projects except Treze, settlers make use of hired labour during the planting and harvesting season and in some cases on a year-round basis. If the contracting of non-family labour were to be prohibited, as stipulated in most settlement plans, incomes would be further reduced. The following table summarizes the potential value of production per farm if all work were to be done exclusively by the settler family. Values are calculated assuming average to good yields and returns per hectare, and taking into account the average family labour force in each case.

	CAM	CAB	VIT	TIR	BON	PIN	TRE
Average Family Labour Force Man/Yr	1.4	2.0	2.9	1.7	1.8 1.3*	1.7	1.6
Dominant Crop Combination	SC/ Fruit	Cane/ SC	Cane/ SC	Cane/ SC	SC/ Veg Veg/* Fruit	Fruit/ SC	Tobacco/ SC
Maximum Area workable by Family (Ha)	2.5	4.2	6.1	3.6	2.6 1.5*	3.5	2.5

Continued...

Table Continued...

	CAM	CAB	VIT	TIR	BON	PIN	TRE
Value of Prod. per Ha of Land in Crops, U.S. $	216	206	238	218	200 1,100*	214	326
Total Potential Value of Production, U.S. $	540	865	1,441	784	520 1,650*	749	816

SC = Subsistence Crops *Japanese Settlers

As in the previous calculation, the total potential value of production includes the value of the product consumed by the family, which would have to be deducted to arrive at a figure for gross income.

Finally, if settlers concentrated on the production of only one of four principal crops, and if all labour were to be carried out by the settler family, and assuming an average family labour force equal to 1.8 man/years, the following gross returns would be possible:

	Yields /Ha tons	Price $/ton	Maximum Area Ha	Labour MD/Ha	Total Value of Production $	Gross Returns per Ha $
Sugar Cane	40	4.90	3.8	125	744	196.00
Passion Fruit	5	46.50	4.0	140	930	232.00
Tobacco	.76	640.00	2.3	190	1,120	278.00
Manioc Roots processed	8.0 2.6	- 140.00	2.5 -	120 120	- 910	364.00

These data indicate that a one-crop operation would result in somewhat higher

returns per hectare than are possible under a multiple crop system. However, the suggested income target would still be unattainable, and, except for the settlers growing manioc, all food consumed by the family would need to be purchased.

All of the foregone analyses show that the proposed income target of U.S. $1,508 is overly optimistic and, where the settler family must depend exclusively upon its own labour resources, virtually unattainable. While survey findings indicate that a few settlers have attained and exceeded the suggested level of income, these cases are exceptions. Invariably, they are related to one or a combination of the following factors: the greater natural productivity of the land in question, the use of mechanized equipment or of additional outside labour, the regular use of fertilizer, and the production of specialized cash crops such as vegetables.

12.3 Potential and Actual Farm Incomes

Under conditions of traditional agriculture which characterize the settlements that were described, potential farm income is almost exclusively a function of labour inputs, the area of land under cultivation, and the types of crops grown. While these variables were taken into account in assessing settlers' potential gross incomes, and while it was found that potential returns lie considerable below the suggested minimum income of U.S. $1,508, the fact that in 1969, 76 percent of settlers in the sample group had gross incomes below U.S. $600 suggests that, for many farmers, even their respective potential incomes are unattainable.

Part of the difference between potential and actual gross incomes

can be explained by the fact that on most farms a portion of the production is retained for family consumption. However, even if it is assumed that the average annual consumption per family of farm-grown food is valued at U.S. $238, the value suggested by the income model presented in Chapter IV, there still remains a significant difference between farmers' potential and actual gross receipts, as the following table illustrates.

	CAM	CAB	VIT	TIR	BON	PIN	TRE
Value of Production and Potential Gross Income U.S. $ (1969)	560	1,116	1,213	1,027	790 3,190*	1,157	816
Value of Product Consumed by Family	238	238	238	238	238	238	238
Value of Product Sold and Potential Gross Income U.S. $	322	878	975	789	502 2,952*	919	578
Actual Average Gross Income of Sample Group	268	674	630	769	467 3,314*	420	397

*Japanese Settlers

Among other factors which need to be taken into account to explain differences between potential and actual incomes the most important ones are differences between official farm prices and those actually paid to settlers, and the fact that full production and average crop yields normally cannot be assumed for the entire area planted to crops on each farm.

In summary, the three levels of incomes that were considered included first, an income target of U.S. $1,508, representing the minimum required by settlers to achieve improvements in levels of living and to

meet the financial obligations implied by the investments made on their behalf, second, a potential income level ranging from U.S. $600 to $1,100 depending on crop types and areas planted and which ought to be attainable under the traditional agricultural conditions characteristic of project, and third, the actual incomes, showing an average of U.S. $565 for the sample group.

It was shown that the majority of settlers are unable to attain the minimum income target of U.S. $1,508, and that even the potential incomes implied by existing market prices do not appear to be within the reach of the majority of settlers. While approximately 7 percent of the sample group attained or exceeded the proposed income target, it was argued that these are exceptional cases and that settlements do not offer the conditions which would permit significant improvements in the economic performance and incomes of the majority of settlers.

12.4 The Nature of Constraints

The seven settlement projects examined in this study were established with the implicit or stated objective of improving the social and economic position of the families to be settled, and of achieving important, direct and indirect economic benefits from the investments that were made.

All of the seven projects were to become enclaves of opportunity, in an area otherwise characterized by monoculture, traditional, semi-subsistence agriculture, the serfdom and dependence of the rural worker, and a conspicuous lack of opportunity for his own progress. Within the colony, the new farmer was to find the necessary conditions for significant

improvements in his social and economic position. Such progress was taken for granted, was considered essential to the success of each project, and was the justification for often very large investments.

Evidence has been presented which shows that colonization can and does result in modest improvements in the general welfare of the previously landless rural worker and his family, and that most settlers who commit themselves to life within a colony will learn to respond to economic opportunities and to become economically productive to the extent permitted by their own abilities and resources, and by the conditions prevailing within the settlement. It is also evident however, that there are serious constraints over which settlers have little or no control and which have prohibited the full realization of the objectives and expectations under which settlements were established.

In this study, the long-term success of settlement ventures was equated with the achievement of a number of basic objectives common to all projects. These objectives clearly imply certain assumptions and conditions which must be met. Among these, the author considers the following to be the most important ones:

1. That farm size, land capability, and location do not impose constraints which prevent settlers from attaining anticipated levels of income.

2. That family labour resources and labour productivity have been realistically assessed and that a farming system is adopted which will permit the optimum use of family labour.

3. That basic services are provided including production credit, guidance in improved farming practices, availability of farm inputs at fair

prices, and access to markets for all products.

4. That the new farmer is central to the settlement process. That his values, attitudes and aspirations are understood and respected and are basic considerations in all efforts to promote social and economic change.

The following assessment will show that most settlements have failed in one or several of these critical areas.

Farm Size, Land Capability, and Location

Farm size, which has been one of the most hotly debated issues among Brazil's agrarian reform planners is, in the opinion of the author, not one of the major obstacles to the success of settlements. In areas of good arable land and reasonable topography, a parcel of land of ten to fifteen hectares is sufficient to fully use the labour of the average farm family, and to provide an adequate basis to meet the proposed minimum farm income, assuming that other essential conditions are being met. This proposition assumes that the use of external labour, mechanization, and cattle raising are not part of the long-range objectives of the project.

Farm size does become a critical factor, however, in conjunction with considerations of land capability, and where continued farm capitalization and modernization are important objectives.

The importance of farm size and land capability in relation to settlers' income potential is illustrated by examples found in all projects of large income disparities between farms of equal size but of different land capability. A hypothetical example serves to illustrate and stress the role of this factor. It is assumed two settlers have adjacent parcels

of land of ten hectares each. Both are growing sugar cane, the exclusive crop marketed by the settlement agency. Settler A has a parcel of nearly level, fertile and reasonably well-drained valley land. He is able to make use of the tractor rented by the cooperative. He is able to plant five hectares of sugar cane and obtains cane yields of sixty tons per hectare without the use of fertilizer. Settler B's land is characterized by slopes of forty to sixty percent and by heavy and eroded clay soils. All labour is done mannually and yields are only forty tons per hectare. He decides to increase yields to 60 tons by applying fertilizer. He uses 2.5 tons of fertilizer per hectare at a total cost of U.S. $100, but finds that at a price of U.S. $5.00 per ton of sugar cane the added yield merely covers the purchase price of the added input. Thus, whether he uses fertilizer or not, he is at a completely unreasonable disadvantage when compared to the position of settler A. If he decides to counter his lower productivity by planting more land, which is often the case, his labour cost will increase, but again in disproportion to the costs encountered by settler A for a similar increase in the area under cultivation. Although fictitious, this example is based upon the stark realities which many settlers confront.

A large disparity in the income position of different settlers, attributable to differences in land capability, was noted in the case of the Colony of Vitoria. The reader will recall that all lots in the project were approximately the same size, but that Terra Preta was an area of very fertile and nearly level land, whereas Barra was characterized by steep slopes and generally very poor, eroded clay soils. The author estimated that average gross returns per hectare of land in crops in the Terra Preta

section were twice as high as in the Barra area, while settlers' returns to family labour at Terra Preta were forty percent higher than those of settlers at Barra.

In an attempt to be fair, the settlement agency adjusted lot prices in accordance with land capability and a number of other factors. A more reasonable approach would have been to adjust the size of individual parcels instead. An increasing number of settlers in the Barra section of the colony are turning to livestock grazing to utilize the land unsuitable for crops and to augment their incomes. Had each family received twenty-five to thirty hectares of land instead of only ten, this would have been a reasonable alternative. As it stands, even with livestock, the settlers of Barra are condemned to lower incomes, or, if they wish to make adjustments, to much higher production costs and lower profits on their investment than their neighbours at Terra Preta.

The constraints imposed by farm size and land capability were also noted in the case of Camaratuba. Farm lots in this project extend from the bottom of the valleys to the upper edge of the tabuleiro. On the bottom land cultivation is limited by annual flooding while cultivation of the upper slopes is prevented by poor soil conditions and regulations prohibiting the clearing of the tree-covered upper slopes. These limitations reduce the effective arable area on most lots to approximately five hectares which, because of the sandy and infertile soils of the area and the need for land rotation, is insufficient.

In a somewhat different setting, the importance of land capability is also evident in the case of the Rio Bonito project. The Japanese settlers, using modern technology and farm inputs, and producing high

value cash crops, are able to achieve very large returns. In contrast, the Brazilian settlers, lacking the skills of the Japanese generally plant lower value crops. However, because of the very low fertility of the soils it is necessary that they use many of the same costly inputs, while their returns to land, labour, and capital are considerably lower.

Finally, farm size and land capability are important considerations with respect to the long-range development of projects, progressive farm capitalization and the modernization of production. Reference has already been made to the role of land capability in relation to the productivity of labour and capital. The disadvantages inherent in land of poor quality are not mitigated but accentuated by modern farm inputs and new technology. Among modern factors of production, mechanization will have the most direct impact upon production and income and will bring both issues of farm size and land capability sharply into focus. Mechanization will result in sharp increases in areas under cultivation with a need for modifications in the existing land rotation system and a need for other corrective measures. Farm size as well as land capability will then become critical factors influencing if not determining the effectiveness of mechanization as well as of other inputs. It is a foregone conclusion that the range of options will be greatest for settlers with the largest areas of good arable land.

The author believes that in all projects with lot sizes of ten hectares or less, that is all projects except Rio Bonito and Pindorama income disparities exist which are directly attributable to differences in land capability. At Pindorama, on the other hand, with lots of 25 hectares each, settlers do have some option of cultivating only the best of their

land. They also enjoy a greater range of possibilities for crop diversification and the development of a farming system which could make more effective use of their limited labour resources. The introduction of coconut, representing a long-term investment, best illustrates this point. With an excess of land, the establishment of plantations which may require as much as eight years from planting to production, will interfere very little with other production activities. This option does not exist on farms where all arable land is already included in the production or rotation cycle.

This study did not specifically inquire into the factor of distance, the geographic location of projects, and the location and distribution of individual farms within colonies. However, the author believes that these factors have played a considerable role in influencing the outcome of the projects that were studied. One needs to add however, that difficulties experienced by settlers in their ability to adjust and to meet performance expectations as a result of distance and location are indicative of shortcomings in settlement procedure and should not be ascribed to geographic circumstances.

Depending upon the services available to settlers, the geographic location of projects in relation to the nearest market centers can be a decisive factor in influencing settlers' choice of crops as well as incomes.

The lack of marketing services at Camaratuba and the distance to the nearest town has forced settlers to depend upon middle-men to buy their products or to pay transport fees which are entirely at the pleasure of the individual trucker. The disadvantages of distance are also evident at Cabo, Tiriri and Pindorama, where the agency or cooperative will market only two or three cash crops, while the marketing of all other crops is

the responsbility of settlers. Because of distance to the nearest markets, settlers are reluctant to produce other crops which, under different circumstances, could help to diversify their operation and to broaden their income base.

At Vitoria, settlers are able to sell through the local cooperative. With the colony being located within walking-distance from the Town of Vitoria, they may also sell at the local feira or town market. At the two very remote colonies of Rio Bonito and Treze, location has no bearing upon settlers' ability to sell their products. Both projects have a dependable marketing system which allows settlers to sell anything they produce. Needless to say, a settlement project without a marketing system or one in which settlers can sell only certain types of cash crops violates one of the important purposes for which colonies were established.

The author believes that location and distance have been important factors in influencing settlers' ability to adapt to their new situation. This appears to hold true particularly for the more isolated projects which did not have ongoing programs of community development and which attracted settlers of widely heterogenous geographic origin. The problem of isolation is likely to have contributed to the high initial rate of turn-over among settlers in such projects as Camaratuba, Cabo, Rio Bonito, and Pindorama.

Adaptation appears to have been most difficult among former cane workers who were accustomed to some form of community life on the engenhos from which they came, and who subsequently were settled in a remotely located project, amidst strangers and on an isolated parcel of land. At Vitoria, the problem of isolation was at least partially mitigated by

proximity of the colony to a large town. At Tiriri, the majority of settlers were selected from among cane workers of the former engenhos which make up the present-day project. At Treze, adaptation problems were minimized through careful selection procedures, by virtue of settlers' background as small, independent farmers, renters, and sharecroppers, and by the cooperative's ongoing program of civic and social development.

Finally, the settlement layout, that is, the distribution and location of farm lots and houses, also has implications for the degree of isolation experienced by settlers as well as for their time budget.

In projects where settlers live on their parcel, a farmer may require a half a day or more for every visit to the settlement center. Unless the project has good administration and a sufficient number of field supervisors, such visits by settlers are not infrequent. They are occasioned by their need to arrange for loans, to purchase farm inputs or groceries, to arrange for the marketing of their products, and to settle other matters. In the poorly administered project, time spent on such visits is often wasted. The agency's field office may be closed, the agronomist or technician the farmer hoped to see is not available, or the settler may simply be told to come back some other day. On the other hand, at Pindorama, where many settlers live in nucleated residential centers, the distance between a settler's place of residence and his lot can represent a considerable cost in time. The settler living a half an hour walking distance from his lot, which is not uncommon, will spend the equivalent of over one month during the year walking to and from his parcel. The cost in time would be equal to that expended in growing a half a hectare of yams or beans. The aldeia or nucleated settlement system of Pindorama

was conceived to facilitate the development of community solidarity and social cohesion among families. Unfortunately it was found that these small villages fulfill little more than a dormitory function and hence have poorly served their intended social purpose.

Family Labour

It is often assumed that the typical peasant family of Northeast Brazil is richly endowed with many hands to make work easy. Indeed, the belief that each family has the equivalent of three or four adults to work the land, seems to be based upon the questionable logic that tradiational western peasant societies were characterized by large families because children were an asset and that the same must hold true for Northeast Brazil. The parallel is completely unfounded and is not supported by the realities of peasant life in the Northeast.

Sample data from 152 families in seven projects provide a fairly representative picture of family size, composition by age, and of the actual labour force of the typical settler family. The results that were obtained are summarized in Table 11.

These statistics show that, while there are an average of 7.1 persons per family, only 1.8 persons (adult equivalents) are productively engaged in the activities of the farm.

There are several reasons for the low ratio of the family labour force to family size. Generally, children under the age of fourteen are little involved in day to day farming activities. They may help weeding, collecting fruit, or tending animals, but the productivity of an undernourished, and often sick child in such activities as hoeing, planting, or the cutting and bundling of sugar cane, is very marginal. Furthermore,

TABLE 11

AVERAGE FAMILY COMPOSITION AND LABOUR RESOURCE*

152 SETTLER FAMILIES

Family Characteristics	CAM	CAB	VIT	TIR	DON	FIN	TRE	ALL
Average Age of Settler	53.2	47.4	40.6	49.2	43.7	43.8	44.5	46.1
No. of Children Living	4.4	7.1	6.1	6.1	5.1	5.5	6.1	6.0
No. of Children living at home	2.7	5.5	5.8	4.8	4.0	4.7	4.2	4.7
Children at home under age 14	2.0	3.2	3.2	3.6	3.0	3.2	3.0	3.1
Children at home over age 14	0.7	2.3	2.6	1.3	1.0	1.5	1.2	1.6
Average Family Size	5.7	8.4	8.3	7.4	6.1	7.3	6.7	7.1
Average Family Labour Force	1.4	2.0	2.9	1.7	1.3	1.7	1.6	1.8

*The family labour force was calculated as follows:

Male family member age 10 to 14	= 0.2
Male family member age 15 to 18	= 0.5
Settler and some over 18	= 1.0
Settlers over age 45	= 0.8
Settler's wife and daughters over age 10	= 0.2

even among these poor people there seems to exist a general taboo on involving the girls of the family in manual work. One notable exception is the peeling of manioc roots which is normally done by women. Children above the age of fourteen, who could and do contribute to family labour, seldom remain at home beyond the age of sixteen or seventeen. Girls tend to stay home longer than boys; however, as they get older they are also less disposed to do farm work. Boys, on the other hand, as soon as they are old enough to fend for themselves, will leave. They will either become agricultural workers elsewhere, or move to the nearest city in search for more attractive opportunities. Thus, the period during which children above the age of fourteen make an effective contribution to the family labour force is relatively short. For every child over the age of fourteen and living at home there are at least two children that are younger. With an average of 1.6 children per family over the age of fourteen, and assuming an equal sex ratio, the effective contribution to labour of a settler's children is very small indeed. Since children leave home shortly after they come of age, they represent a liability rather than an asset.

To delay the exodus of young people from colonies, and to bring the family labour force in line with the estimates of planners, it would be necessary to make living conditions and opportunities more attractive. In some projects this need has been recognized. At Rio Bonito and Treze, opportunities exist for education beyond the primary level. At Pindorama, vocational training is available to interested young people. These efforts, it is hoped, will prepare them for employment elsewhere and, in delaying their departure, will assure a larger contribution to family labour.

It is of some interest to note that, in the Colony of Vitoria,

families in the sample were found to have an average of 2.6 children above the age of fourteen living at home, which is higher than in any other project. The proximity of the colony to the Town of Vitoria suggests a possible explanation.

Two additional factors need to be considered. First, the settler frequently becomes patrão for the children of less fortunate relatives and friends who cannot provide for them. He may also have brothers, sisters, parents, aunts or uncles who may seek his help and live with him. Sometimes there will be an addition to family labour, but often there is not. Secondly, it will be noted that the average age of settlers in the sample population is 46.1, an age level at which most rural workers have already entered a phase of declining productivity and capacity for sustained physical work. The average age of settlers in the different projects also provides some indication of their average age at the time they were selected. The majority were over thirty when they became settlers. Better results might have been obtained by selecting younger individuals.

Little comment is necessary about the difference in performance of the individual farm as well as of the project where less than two people per family are working five hectares of land instead of three or four working ten. In most colonies, settlers do have the option of employing salaried workers on a temporary or permanent basis. However, for the settler whose own cash returns to family labour are little more than U.S. $1.00 per man/day, and who must pay a minimum of U.S. $0.80 per day to any hired worker, the attractiveness of this solution is hardly convincing. Whether a settler earns U.S. $0.75 per day or $1.60, he is off to a bad start if he must depend on outside labour. The income which

the planner would generously attribute to the labour of the settler family goes elsewhere. Yet, this is precisely the position in which at least half of all the settlers in most of the seven projects find themselves.

Partial mechanization and crop diversification are two possibilities which could result in increased production and a more effective use of family labour. The first alternative is open only to settlers with suitable land, and of course, only in those projects where the necessary equipment is available on a regular basis.

The need for crop diversification to assure optimal use of family labour is recognized in most settlement proposals. The reader will recall that plans for Cabo and Vitoria called for the production of five different cash crops. In addition, settlers were expected to grow subsistence crops and to raise animals. At the time of this study, sugar cane, which, during the three-months cutting season between November and January, entirely monopolizes settlers' limited labour resources, accounted for fifty percent of the land in cultivation and roughly eighty percent of settlers' cash income. At Tiriri, Pindorama, and Treze, a similar dominance of one or two cash crops was noted.

While the possibilities for crop diversification are generally favourable, a modification of the present marketing system would be necessary in all colonies except Vitoria, Bonito, and Treze.

Farm Services

The need to provide settlers with basic farm services is recognized in all settlement proposals with which the author became familiar. This service function is to be met by the agricultural cooperative which,

under Brazil's agrarian reform legislation is to be part of every public and private colonization project. The cooperative is to be established by the settlement agency with the participation of settlers. Settlers are to become increasingly involved in its day to day administration and, by the time the project is "emancipated", which normally occurs after ten years, settlers are to have acquired the necessary abilities to assume full control. The cooperative is to be responsible for agricultural credit, production orientation, the sale of farm supplies, and the marketing of settlers' products.

Among the shortcomings of the projects studied and the limitations confronting settlers, those relating to the quantity and quality of basic farm services and the manner in which they were provided, are, in the opinion of the author, the most serious. In addition to the constraints imposed by land and labour, lack of adequate services are most directly responsible for the general lack of progress. The following table provides a summary of the services available in each of the seven projects:

	CAM	CAB	VIT	TIR	BON	PIN	TRE
Farm Credit	Yes	Yes	Yes	Yes	No	Yes	Yes
Production Orientation	No	No	Yes	No	Yes	Yes	Yes
Farm Inputs	No	No	No	No	Yes	Yes	Yes
Marketing Services	No	Cane only	Yes	Cane only	Yes	Cash crops only	Yes

While it is evident that in all projects at least one or two basic services

are being offered, the absence of any one of the four services is likely to impinge upon the effectiveness of those services that are made available. Also, as has already been suggested, the manner in which services are provided in most projects is open to considerable criticism.

Except for Rio Bonito, all colonies were found to have some provisions for production credit. However, as was noted in the discussion of individual projects, production loans are determined on the basis of settlers' previous income and are normally tied to certain cash crops which must be sold through the cooperative or the project agency. At Camaratuba, loans are only available to settlers raising livestock. While the loan is in effect, settlers may not buy, sell, or exchange animals without authorization from the lending agency. At Cabo, Vitoria, and Tiriri, loans are tied almost exclusively to the production of sugar cane. At Rio Bonito, credit arrangements have been temporarily suspended until debts incurred under the previous administration are liquidated. At Pindorama, some long-term loans have been provided for the establishment of coconut plantations, virtually all other loans are tied to the production of passion fruit. Treze is the only project with a policy of supervised credit and the active participation of settlers in the planning of short and long-term production and credit arrangements. It is also the only project with a cooperative prepared to assume credit risk and to establish loan quotas on the basis of settlers' potential future income rather than on the basis of their past performance.

Amounts borrowed by settlers are relatively small, as the following table of information from the sample group indicates:

	CAM	CAB	VIT	TIR	BON	PIN	TRE
Average Amounts Credit Used Sample Group 1969 U.S. $	9	153	39	36	336*	123	287

*Incl. Brzln and Japanese Settlers

While it may be argued that settlers lack the experience to make prudent investments and hence would be unable to use larger amounts of credit, this contention is responsible for the ironic and contradictory situation where the settlement agency, on the one hand, wishes to promote production, but on the other, fails to provide supervision and guidance and refuses to assume any risks. In the end, both the agency and the settler are losers, albeit unequal ones. The amount of credit given to the settler depends upon his previous income, while his income will never rise without an increase in the amount of credit available to him, and without guidance in its use.

In general, settlement agencies seem to have attached low priority to the development of an orientation or extension service which would take a personal interest in the activities and performance of each farmer. Where such services have been attempted they usually were offered sporadically and in the form of orders and instructions handed down in an authoritative manner. However, there are some exceptions. At Vitoria, guidance and orientation is available to settlers who take the initiative to seek such assistance. The role of the agency's agronomist is largely a passive one.

He does not normally visit individual farms. At Rio Bonito, Japanese settlers are constantly demanding new information on improved farming methods. INCRA responded imaginatively by assigning qualified and dedicated staff to the project. At Pindorama, extension work was for several years in the hands of various foreign groups providing assistance to the colony. Production orientation focussed almost exclusively upon passion fruit and other cash crops of interest to the cooperative. Guidance in the form of directives imposed from above met with only limited success. In more recent times, the system of orientadores was introduced. In each aldeia, a capable farmer was singled out for special training, who in turn provides guidance to other farmers of the same community. Orientadores receive a small monthly salary for this service. At Treze, the orientation of settlers is an integral part of a learning process through regular group training. There is no coercion and there are no directives imposed from above. Settlers are encouraged to think of possible solutions to their own farm problems and to discuss them freely with other settlers and in meetings. While requiring considerable patience, this process has proven viable. Except for the Japanese at Bonito, settlers of Treze were found to demonstrate greater responsiveness to new farming ideas and methods than in any other project.

Farm inputs used by settlers include tools, small equipment, fertilizer, and pesticides. These items are available at fair retail prices at Bonito, Pindorama, and Treze. In all other projects settlers must make their own arrangements for the purchase of these inputs. Because of the high cost of fertilizer, its use is only economically justifiable on a few crops and when obtained at minimum cost through bulk purchases. Lack of

such service, which can only be provided by the cooperative or settlement agency, represents in many cases a serious barrier to increased production and productivity.

Reference has already been made to the irregularities which characterize the marketing systems of most projects. Lack of a complete marketing service imposes limits upon the availability, scope, and effectiveness of all other services. The practice of using credit as a means of committing farmers to the production of one or two crops and of obliging them to sell exclusively through the lender is common throughout the Northeast and is fully in keeping with traditional ways of doing farm business. However, this practice, where it continues to be followed by settlement agencies or cooperatives, is hardly conducive to the development of trust and confidence among new farmers in those entrusted with the management of their affairs.

The Settler: Abilities, Values, Attitudes and Aspirations

Implicit in most settlement plans is the idea that the settler is to be the principal if not exclusive beneficiary of the settlement process. It is also assumed that improvements in his situation will depend largely upon his own efforts and therefore, that he adapts readily to his new environment, that he is able to adjust his attitudes and values, and that he has or acquires a strong motivation for self-betterment. Whether these assumptions are valid or not, in the implementation and management of most projects they were frequently denied, suggesting the contrary view that the settler stands in the way of his own progress, and that he cannot be trusted to make his own decisions.

The possibility that the settler is able to learn, to adjust,

and to respond to new situations is rarely given a fair trial. It is assumed he is stubborn, tradition-bound and utterly helpless. Instead of allowing him participation in the decisions concerning his own welfare and future, these decisions are made for him. He is told what he must grow. His house is built for him. All that seems required of him is obedience and work for a future which he may not understand or want.

His values and attitudes are often ignored. Instead of granting him dignity through his own efforts of self-betterment, patterns of dependence he must learn to escape are further entrenched. One form of dependence is exchanged for another. He is given what others think he needs. He takes such help for granted, he accepts it, he learns nothing, and nothing is changed.

While his aspirations are to seek a better life for himself and for his family, to find dignity and respect, and a place to live and to be free, these aspirations, the fulfillment of which represents one of the fundamental justifications for land reform, are often stifled. He soon learns that what he has gained is little better than what he has left behind. He slaves and toils. One day indistinct from another with little opportunity and little progress.

Under the conditions and constraints under which he must work, the profit motivation the planner attributes to him or hopes he will acquire often becomes a mockery. His failure to perform as expected, is used as one more proof of "the dumb peasant, unable to sort out his own affairs".

The assumption implicit in the plan, that the campesa is capable of change, represents the very essence upon which the success of the project depends. Where this assumption is subsequently denied by the actions and

attitudes of the agency, failure is inevitable.

In the opinion of the author, far too little consideration was given in the execution and management of projects to the beneficiary, his feelings, thinking, acting and reacting, and to his values, attitudes, aspirations as well as his fears.

Penetrating the complexities of peasant life in an environment and society completely alien to the researcher is a demanding task. The survey upon which this study is based did not pretend to deal with the more difficult cultural aspects and problems in land settlement. However, the author believes the following observations and conclusions about settlers to be valid.

The study produced little evidence in support of the often made assertion that the campones is inherently lazy and stupid. If anything, it might be argued that most settlers show themselves remarkably adept in surviving under conditions that are hardly conducive to human happiness and which at times must seem to challenge the very meaning of existence.

Settlers have almost without exception responded to the opportunities presented to them. They are working as much land as is possible with the limited labour resource and relatively primitive technology at their disposal. They have responded to prices and are growing the crops which are most profitable and which they know or have learned how to grow. They have learned to use new factors of production where such factors are available and profitable. In a total sample of 152 settlers, the proportion of those using chemical fertilizers has increased from nine percent prior to settlement to forty-nine percent after they became settlers. When asked why they do not adopt more of the many recommended practices, their

response is hardly surprising: "Because we have never been told or because we cannot afford the practices or inputs that are recommended". Where orientation has been absent, settlers have developed their own system of land use and production. Their behavior does not reflect stupidity but considerable intelligence and adaptability to whatever conditions they find.

The charge of laziness is equally insidious. In the absence of incentives, and in the light of the settler's cultural background and the hopelessness and despair of his previous situation, it should surprise no one that he is not imbued with the sometimes questionable virtues of the Puritan Ethic. His apparent tendency to produce little more than what he needs for his own support and that of his family, and his failure to live up to the production expectations of the planner, upon closer examination will show that in most cases, he is already using his meager resources to full capacity.

Economic incentives and the rewards for additional effort are weak and insufficient to warrant additional investments of labour and capital. As already pointed out, there is little incentive in using additional labour beyond the family's own resources. Similarly, the settler on poor land who must double his yields of sugar cane to cover the cost of fertilizer can hardly be accused for his unwillingness to hazard the risk entailed in such additional investment.

His previous experience and precarious economic position will deter new ventures and experimentation. Without sound guidance and advice in decision-making, and without concrete results following such advice where it is provided, his range of alternatives is limited. He does not have the freedom of choice to make the decisions the planner

hopes or assumes he will make. Nor will he be able to produce for ends which he does not understand. He cannot escape from self. Experience dictates his goals and the manner in which he can achieve them.

Finally, living in a society in which the least amount of respect is attached to manual work and particularly to agricultural work, it must seem meaningless to perform more work than is necessary. In other words, additional effort only becomes attractive when it holds the promise of escape from a status which society scorns and considers loathsome. This attitude is reflected in the aspiration of settlers for their children, and in the life style of those settlers who have acquired some wealth. Settlers were asked what occupations they desire for their children. Their sons are to become mechanics, truckdrivers, craftsmen and industrial workers. Some also mentioned white-collar occupations. Among 129 respondents for whom the question was relevant only seven or 5.4 percent wanted their sons to work in agriculture. Preferred occupations for daughters included sewing, teaching, health work, and a few others. Of ninety-nine respondents, only twelve percent wanted their daughters to marry a farmer and to become housewives.

In most of the colonies, one finds a few settlers who have achieved considerable prosperity. They will normally show their superior position by ceasing to do manual agricultural work, and by adopting the mannerisms of the typical landlord.

Thus, it is also suggested that the settler's behavior is strongly influenced and conditioned by the system of values of the society in which he lives. However, before in too great haste making this conclusion a major issue, an important rejoinder is necessary. There is nothing unique about

the Brazilian camponês and settler desiring something better for his children. Surely, this is a universal trait, without which human progress would have been left to fate. The behavior of the settler who turns landlord seems equally logical and predictable. He is doing what is expected of him and is following the only model he knows. Even if it is argued that agricultural work is despised because traditionally such work was below the dignity of a free man, ultimately, this attitude must be traced to the low economic position of the individual performing the activity. In other words, the real problem appears to be poverty rather than the nature of the work performed. If this conclusion is valid, it follows that acceptance of the camponês and respect for him and his work will grow in proportion to his material position. In the same manner, his self-respect and personal dignity will grow in proportion to his own success and his acceptance by others. Having said this, one arrives at the argument, that lack of progress signifies an absence of economic opportunity and incentives more so than cultural barriers and obstacles that cannot be overcome.

Project Implementation

Finally, while the author concludes that settlers' limited progress is symptomatic of a general lack of opportunities and of conditions necessary for improvements, the difficult circumstances under which most projects were established, and constraints of a higher order, cannot be ignored.

The settlements of Cabo, Vitoria, Rio Bonito, and Pindorama had official plans. The other three colonies were "accidents" of circumstances. For financial and other reasons, none of the four planned projects were

implemented in accordance with the details and schedule of their respective plans.

There were interminable delays in funding, and problems created by monetary inflation and run-away costs. All suffered from discontinuity in administration and policy. There were no rigorous procedures in selecting settlers, and often compromises were necessary to accommodate families already living on the land. There was a high turn-over of settlers resulting in inefficiencies and added costs. There were difficulties in securing required personnel at all levels. Support from cooperating agencies was not forthcoming or was provided sparingly. Settlers found themselves with little or no assistance and only a small portion of the production credit specified in the plan. Settlers were asked to grow crops with which they were unfamiliar. Frequently, marketing arrangements were unsatisfactory. Little effort was made to involve settlers in decisions concerning their own welfare and future, and to bridge the gulf between the camponês and those in charge of his affairs.

Among the other three projects, the Colony of Camaratuba was never intended for the establishment of small and eventually independent farmers.

Tiriri, like Cabo and Vitoria, had its beginning during a period of intense social unrest and political uncertainty. There was never an official plan. Most of the project's early history was characterized by chronic financial troubles and mismanagement.

Treze had its beginning as an election promise. Its survival, however, and its success in establishing a strong sense of community spirit among settlers is entirely attributable to its present far-sighted leadership.

and to the unwritten rule that the peasant's personal growth and self-determination must rank first among all priorities.

12.5 Summary and Conclusion

It was proposed that the average settler family would require a disposable annual income of at least U.S. $576 to enjoy a level of living comparable to that of the salaried rural worker. However, in view of investments made on behalf of settlers and the desire to raise levels of living over those they have left behind, it was shown that an annual gross income of at least U.S. $1,508 per farm would be necessary to achieve the desired objectives.

An analysis of settlers' potential income showed that under conditions of traditional agriculture which characterize most projects, the suggested income target is virtually unattainable. Extrapolation of sample data suggested that actual annual gross incomes for the majority of settlers were less than U.S. $600. It was proposed that settlements do not offer the conditions necessary to permit significant improvements in economic performance and income.

Important constraints were identified and examined. The author concluded that farm size is only critical in relation to land capability and in imposing limitations upon the range of options available for farm improvement and modernization. Differences in land capability on farms of equal size were considered responsible for important differences in farm incomes. It was concluded that the geographic location of projects, distance to markets, and the internal distribution of lots and houses are important variables which, depending upon the services available to settlers, have a bearing upon their ability to adjust, their production choices, and

upon their time budget.

An appraisal of the labour resources of the typical settler family was presented. The assumption of ubiquitous family labour was contested. The contracting of outside labour was not considered an attractive alternative, while the advantages of mechanization were considered open only to settlers with suitable land and in those projects where the required equipment is available on a regular basis. Crop diversification was suggested as a possible means of making more effective use of family labour and of increasing incomes. However, it was argued that a prior change in the marketing system of four of the seven projects would be necessary.

Among the constraints confronting settlers, those relating to deficiencies in the provision of basic farm services, were considered to be the most serious.

It was suggested that in most projects, basic assumptions about settlers' motivation and aspiration for self-betterment were denied, and that settlers were rarely given an opportunity to become involved in decisions affecting their own welfare and future. The assertion that settlers are lazy and stupid was contested. Lack of economic opportunities and incentives was suggested as the primary cause for their lack of progress.

Finally, reference was made to the difficult circumstances under which most projects were established and to constraints of a higher order which affected their early history and development.

XIII

SUMMARY AND CONCLUSIONS

Agricultural colonization through the establishment of settlement projects is one of the principal methods of carrying out Brazil's agrarian reform.

This study grew out of the author's travels in Northeast Brazil in 1969, visits to various public and private settlement projects, and the observation that existing colonies seemed to have poorly served their intended social and economic purpose, while at the same time huge new investments were being contemplated for the establishment of further colonies under the same traditional plans and procedures which in the past appear to have been unsuccessful.

The purpose of this study was to inquire into the principal causes of the success and failures of seven representative colonization projects in the coastal region of Northeast Brazil, and to provide a basis for the formulation of more reliable planning criteria and implementation procedures for future colonization activities to be carried out in this region.

To achieve the basic research goal of evaluation, a model was established which embodies the principal government objectives for planned land settlement, and which provided the common terms of reference against which projects were assessed. Each project was examined individually,

focusing upon its development and general characteristics as a social, economic, and administrative unit, and upon the individual settler, his past and present socio-economic status, and his achievement in the light of the economic opportunities presented to him.

Seven major projects were selected from among colonies located in the coastal region of Northeast Brazil. The following criteria were employed in the selection of projects:

1. that the project is located in the coastal region of N.E. Brazil,
2. that the project has been in existence for at least five years,
3. that the project has not been emancipated,
4. that each project represents the work of a different settlement agency.

The projects selected included the Colony of Camaratuba, established in 1936 by the State of Paraiba, the CRC projects at Cabo and Vitoria, both established in 1961 by the State of Pernambuco, the Colony of Tiriri, Pernambuco, established in 1963 by the Superintendency for the Development of the Northeast (SUDENE), the Colony of Rio Bonito in the State of Pernambuco, established in 1956 by the Brazilian National Institute of Immigration and Colonization, the Colony of Pindorama in Alagoas, established in 1954 by the Companhia Progresso Rural, a private organization, and the Colony and Cooperative of Treze, established in 1961 by the Bank of Brazil.

The following government objectives common to all planned colonization were identified:

1. to improve the level of living, housing, health, and education of the settler and his family,

2. to firmly attach man to the land,

3. to promote the rational exploitation of land resources,

4. to contribute to regional economic growth and development.

The first of these objectives was considered the most important one. Its realization would depend largely upon the settler's own economic performance and therefore would have a direct bearing upon the achievement of all other objectives. To assess the economic performance of settlers in relation to the above objectives, an income model was established which sets the annual minimum income required by the typical settler family of two adults and five children at a level of U.S. $1,508. This figure was derived as follows:

1.	Food expenditures	U.S. $ 462
2.	Other family expenditures	144
3.	Annual property debts	250
4.	Investment and savings	200
5.	Cash operating expenditures	452
	Total Annual Gross Income Required	U.S. $1,508

In addition to a determination of farm incomes for comparison against the above model, settlers were asked to comment on changes they have experienced as a result of settlement with respect to

1. their ability to feed and clothe their family,

2. the availability of healthservices,

3. educational opportunities for their children,

4. housing conditions.

At the level of the project, each colony is treated descriptively, giving consideration to its history and development, and to the conditions and economic opportunities existing at the time of the survey.

Data were collected during the period between January and April of 1970. Data were derived from interviews of a total of 152 settlers in the seven projects, from interviews of administrative and other personnel connected with the projects, and from a variety of published sources. Farm data were collected by means of a standardized questionnaire which was administered by three agricultural technicians. Data were transferred onto standard computer cards for the preparation of summary statistics and simple cross tabulations.

The study suffers from many obvious limitations including those imposed by the scope of the research undertaking, the cultural complexities of the research environment, and the virtually complete lack of reliable data and of previous research.

An assessment of the achievements of settlement projects in relation to the four basic settlement objectives led to the following observations and conclusions:

1. Levels of Living, Housing, Health and Education

It was found that improvements were reported least frequently in the area in which settlers ought to have experienced the most marked improvements over their previous situation. Of the sample group, only 52 percent reported improvements in their ability to meet the basic needs of food and clothing for themselves and their families. A strong correlation was found between settlers' response to this question and their

status prior to settlement, with seventy-two percent of former landless rural workers reporting such improvements as compared to only forty-two percent of former independent farmers, renters, or sharecroppers. The low incidence of settlers reporting improvements in their ability to provide basic family needs can be directly related to the fact that 76 percent of the sample group achieved annual gross incomes of less than U.S. $600, placing the majority of settler families into an income category which is roughly comparable to that of landless rural families with earnings of one to two minimum salaries. Interview results showed that 73 percent of settlers experienced improvements in housing conditions and in educational services for their children, while only 61 percent reported improvements in health services. These figures are consistent with the fairly liberal housing policy followed by most settlement agencies and with provisions for primary education in all projects. It was suggested that the lower response on health services was related to the fact that such services are not normally available within projects, and that because of distance to the nearest health service post, settlers find it difficult to avail themselves of the services to which they are entitled.

2. To firmly attach man to the land

It was suggested that this second objective of land settlement would depend upon conditions within settlements which are convincingly more attractive than those found in the surrounding rural areas or in towns and cities. The very high rate of turn-over among settlers which characterized virtually all projects did not permit the conclusion that land settlement has been an effective instrument of firmly attaching man

to the land.

3. To promote the rational exploitation of land resources

It was concluded that the use of resources entrusted to settlers must be considered rational if assessed in the light of the conditions and opportunities under which they operate, however, that the actual resource use does not correspond to the expectations under which projects were established.

4. To contribute to regional economic development and growth

It was demonstrated that settlers do make a substantial contribution to the regional economy. However, since the majority of settlers do not achieve even half of the minimum annual income implied by the investments made on their behalf, it was concluded that the magnitude of contribution of settlements to the regional economy has been considerably below expectations.

On the basis of the foregone evaluation, the general conclusion was proposed that although there was some evidence of progress toward the achievement of the four critical settlement goals, by and large, projects have fallen considerably short of the hopes and expectations under which they were established. It was proposed that settlements did not offer the conditions necessary to permit significant improvements in the economic performance and income position of settlers and hence in achieving the most critical of the four objectives, and that either settlement goals were unrealistic or that the conditions required for their realization have not been met. This proposition led to a reassessment of basic economic objectives and to an analysis of the constraints which impinge

upon settlers' performance.

An analysis of settlers' potential income showed that under conditions of traditional agriculture which characterize most projects, the suggested income target of U.S. $1,508 is virtually unattainable. Extrapolation of sample data suggested that in 1969, actual annual gross incomes for the majority of settlers were less than U.S. $600.

It was shown that the constraints of farm size in relation to land capability has direct effects upon settlers' income and choice of production alternatives. Distance to markets was considered a serious constraint in those projects where marketing services are absent or incomplete. Distance was also considered a critical variable in affecting the degree of isolation experienced by settlers and their ability to adjust to their new situation.

The effective family labour force was shown to be smaller than normally assumed. The size of the family labour force was considered a critical factor affecting the area of land under cultivation on each farm and farm income. The use of outside labour was not considered an attractive alternative, while the advantages of mechanization were considered open to only a few settlers with suitable land and in projects where the required equipment is available on a regular basis. Crop diversification as a means of making more effective use of family labour was considered as a possible option only in those projects offering a complete marketing service.

Deficiencies in the provision of basic farm services, and the authoritarian manner in which the few services available were provided, were considered to be the most serious constraints confronting settlers. Credit arrangements were shown to involve settlers in a vicious circle

from which there is no escape. Loans to farmers are determined on the basis of previous incomes while incomes will never rise without progressive farm capitalization and larger investments. On the other hand, marketing arrangements in many projects were found to impose serious restrictions upon the production options open to settlers.

The almost complete negation of opportunities for settlers' involvement and active participation in the decisions affecting their own future was considered as a further very serious obstacle to social and economic change. The author also contested the assertion that peasants are lazy and stupid, and that this may be a major reason for their poverty and lack of progress.

Finally, reference was made to the difficult circumstances under which most projects were established and which affected their early development.

In summary, the study provides bases for the following principal conclusions:

First, that the basic objectives of colonization are attainable provided that the necessary conditions are met.

Second, that none of the projects included in this study has been successful in attaining the general objectives of planned colonization.

Third, that the projects considered are, by and large, characterized by the persistence of traditional agricultural conditions, virtually indistinct from those which exist in other rural areas of the region, and hence, that projects have failed to offer effective solutions to the constraints of poor land, low productivity of labour, the scarcity of working capital, the lack of modern farm inputs at reasonable prices, the lack of extension

services, and the absence of dependable markets for all products.

Finally, the author believes that the initial failure of projects to create a favourable social and economic environment for the achievement of basic settlement objectives is attributable to the very difficult circumstances of the times when these projects were forced into existence. Beyond this, however, the author would submit that absence of change can only be equated with a more serious ill, - the failure to comprehend and absence of genuine commitment.

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APPENDIX

QUESTIONÁRIO - PARCELEIROS

Entrevistador.....Data.....

Colônia.....Engenho ou Divisão.....

1. Nome do Colono.....Número do Lote.....

2. Onde nasceu? Municipio.....Estado.....

3. Idade..... 4. Estado Civil S..... C..... V..... O.....

5. Sabe ler e escrever? Sim..... Não..... Anos na escola?.....

6. Em que ano o Sr. chegou aqui?.....

7. Quantos filhos e filhas o Sr. tem?..... 8. Quantos moram em casa...

9. Quais são as idades deles?.....

10. Quantos estão na escola?.....

11. Qual a ocupação que o Sr. gostaria que seus filhos e filhas tivesse?

Filhos.....

Filhas.....

12. O Sr. acha que isso será possível? Sim....Não....Depende....NS.....

("Não" ou "Depende") Por que ou depende de que?.....

.....

13. Na sua opinião o estudo ajuda seus filhos terem uma vida melhor?

Sim.... Não.... Por que?.....

VIDA ANTES DA COLÔNIA

14. Onde o Sr. morava antes de vir para êste lugar?

Local.....Município.....Estado.....

Na Mata.....Agreste.....Sertão.....

15. Qual o tipo de trabalho que o Sr. fazia onde morava antigamente?

.....

Trabalhava para você?.....Ou para outros?.....

16. Quanto tempo trabalhou no último emprêgo?.....

17. Por que deixou?.....

18. Antes de vir para aqui o Sr. passava algum tempo de cada ano sem trabalho? Sim..... Não.....Normalmente quanto tempo por ano?.....

Qual a época do ano?.....

19. Antes sua espôsa e filhos trabalhavam também?.....

20. O Sr. na vida de antes tinha comida e roupa para familia mais fácil ou mais difícil que hoje? Mais fácil.....Mais difícil.....

Mesma coisa..... Por que?.....

21. Para seus filhos estudarem, era melhor onde morava antes ou agora?

Antes..... Agora..... Por Que?.....

22. Para sua família a assistência médica era melhor antes ou agora?

Antes..... Agora..... Por que?.....

23. A casa onde o Sr. morava foi alugada.....própria.....do patrão....

Era melhor que agora? Sim.....Não..... Por que?.....

EXPERIÊNCIA NA AGRICULTURA ANTES DA COLÔNIA

24. Quantos anos o Sr. trabalha para você?..... Para outros?.....

25. O Sr. tinha algum sítio antes de vir para colônia? Sim.....Não.....,

Próprio.....Alugado.....Outros.....

Condição Legal	Zona M	Zona A	Zona S	Área ha	Quantos Anos	Principais Culturas
Com Título						
Sem Título						
Alugado						
Lote Subsist.						

26. Além dessas culturas (25) quais as outras que o Sr. sabia plantar?

Frutas	Lav.Anuais	Lav.Comerciais	Verduras
banana.....	mandioca.....	cana de açucar.	tomate.....
manga.....	macaxeira.....	fumo.....	cebola.....
laranja.....	batata doce...	algodão.....	pimentão.....
abacaxi.....	batata inglêsa	arroz.....	alface.....
abacate.....	inhame.....	milho.....	cenoura.....
jaca.....	.....	feijão.....	coentro.....
côco.....	.....	café.....	jerimum.....
melância.....	.....	.....	.....
.....	.....	.....	.....

27. Quando o Sr. trabalhava para outros na agricultura, você tomava conta dos outros trabalhadores.....,do plantio.....preparo da terra ....., colheita....., criação dos animais.....,ou outras responsabilidades? Quais?.....

28. O Sr. já usou na agricultura (antes da colônia): adubo orgânico? (estêrco, torta de mamona).....adubo químico..... inseeticidas e fungicidas (remédios contra doenças e pragas)..... animais com arados ou grades.....tratrores para cultivar a terra.....

Obs.....

29. Antes de chegar aqui o Sr. era sócio de uma cooperativa ou sindicato? Sim..... Não..... Tempo.....

30. Antes o Sr. tinha experiência (ou sabia) para vender produtos agrícolas? Sim..... Não..... Para quem? Feira.....Intermediários ..... Cooperativa..... Usina..... Outros.....

VIDA E ATIVIDADES DO RESPONDENTE NA COLÔNIA

31. Quais as coisas que o Sr. trouxe para aqui?

1. Utensilios domésticos: geladeira.....; máquina de costura....; rádio....; televisor....; fogão à gás....; bicicleta.....; ferro elétrico....; outros.....

2. Animais: Sim....; Não.....

Quantos? Caprinos.....; Ovinos.....; Bovinos.....; Suinos.....; Equinos.....; Aves.....;

3. Ferramentas agrícolas e implementos:.....

.....

4. Dinheiro: O Sr. trouxe bastante dinheiro para começar aqui?

.....

32. Qual o tamanho do lote que o Sr. recebeu? .....ha

1. Seu lote continua do mesmo tamanho....., aumentou....., ou diminuiu....., de quanto?..... ha

2. Por que?.....

33. O lote pertence a você ..... ou arrendado.....

(Se a terra é dêle) O Sr. iniciou pagamento? Sim..... Não.....

Se não, por que?.....

Se sim, quanto paga por ano mais ou menos?.....

(Se a terra é arrendada) Quanto o Sr. paga por ano?.....

O Sr. poderá comprar essa terra? Sim..... Não.....

Se sim, você vai comprar? Sim..... Não.....

Se não, por que?.....

Mais ou menos quanto vale um hectare de terra aqui?.....

34. Como o Sr. encontrou seu lote quando o recebeu? Tôda encapoeirada ou alguma parte pronto para plantar?.....Qual a área?.....

35. Qual a área que o Sr. plantou depois que chegou aqui no:

	Área	Principais Culturas
1º ano		
2º ano		
3º ano		
1969		

36. Quantos e quais os animais o Sr. recebeu da administração?

Bovinos....., Equinos....., Caprinhos....., Ovinos.....,

Suinos....., Aves....., Outros.....

37. Qual a ajuda de assistência que o Sr. recebeu antigamente e recebeu em 1969 da administração (incluindo cooperativa)?

Categoria	1º	2º	69	Tipo de Assistência
Preparo da terra Ajuda mecân.				
Plantas e Sementes				
Adubos Inseticides Fungicides				
Ferramentas Agrícolas				
Crédito para Consumo				
Crédito para Produção				

38. O Sr. pode dizer em que ano mais ou menos, sua vida melhorou depois que chegou aqui?.....

39. O Sr. recebeu sua casa pronta, ou o Sr. mesmo construiu ou recebeu assistência para construir? Casa pronta....., Assistência..... Quais?.....

40. Habitação:

Tipo de Casa: Tijolo..... Taipa..... Palha..... Madeira.....

Coberta: Telha..... Palha..... Capim..... Zinco.....

Piso: Cimento..... Tijolo..... Chão batido.....

Privada: Interna..... Externa..... Não tem.....

Banheiro: Interna..... Externa..... Não tem.....

Iluminação: Elétrica..... Querozene..... Carbureto.....

Agua: Encanada..... Chafariz..... Poço..... Fonte.....

Rio..... Distância de Casa.....

Quantos quartos tem sua casa? Salas....., Cozinha.....

Quantos pessoas moram na casa?.....

(Ao entrevistador, situação geral da casa?) bom.... média.... ruim....

41. Utensílios domésticos que o Sr. tem agora:

geladeira....., máquina de costura....., rádio....., televisor.....,

fogão à gás....., bicicleta....., radiola....., outros.....

ATIVIDADES AGRÍCOLAS

42. Uso da Terra:

Área plantada: (normalmente em cultivação incluindo pastagens artificiais) .....ha

Área descansando .....ha

Área cultivável .....ha

Área imprestável .....ha

43. O Sr. pretende aumentar a área plantada? Sim.... Não.... Quanto....

54. Cálculo da Produção:

	Área ou nº pés plantado	Área ou pés em produção	Produção por ha	Produção em 1969	Adubação	Irrigação
Banana						
Manga						
Laranja						
Abacaxi						
Abacate						
Jaca						
Caju						
Côco						
Goiaba						
Maracujá						
Mandioca						
Macaxeira						
Bat.doce						
Inhame						
Milho						
Feijão						
Cana Açucar						
Fumo						
Algodão						
Arroz						
Amendoim						
Bat.Inglêsa						
Verduras						

Quais Verduras?.....

45. Sempre plantou os mesmos produtos? Sim..... Não.....

1. Se sim por que?.....

2. Quais as que introduziu recentemente?.....

Por que introduziu?.....

46. Você faz queimada antes do plantio? Sim..... Não.....

Por que?.....

47. (Se o respondente disse que usa irrigação) Qual tipo de irrigação o Sr. usa?.....

48. (Ao entrevistador: se o respondente não usa adubos químicos, orgânicos) Por que o Sr. não usa?.....

49. O Sr. usa inseticidas e fungicídas contra pragas e doenças das plantas? Sim..... Não..... Por que não usa.....

50. Rotação de culturas: O Sr. planta todo ano a mesma lavoura no mesmo lugar? Sim..... Não..... Por que?.....

51. A onde o Sr. vende os produtos das lavouras? CARE..... Feira..... Intermediários..... Cooperativa..... Usina.....

52. O Sr. tem problemas ou dificuldades em vender os produtos? Sim... Não..... Quais problemas?.....

53.

Animais	Quantos vendeu em 1969	Quantos comprou em 1969	Quantos tem agora	Observações Para onde vende? À quem?
Bovinos				
Equinos				
Caprinos				
Ovinos				
Suinos				
Aves				

54. O Sr. vende os produtos dos animais como?

Ovos: Quantos por mês?..... Onde?.....

Leite:Litros por mês..... Onde?.....

Queijo: kg. por mês ..... Onde?.....

55. Na sua opinião o que é melhor para acabar com as doenças e as pragas, a reza ou os remédios? Reza..... Remédios.... Não sabe.....

Depende..... Por que ou depende de que?.....

56. O Sr. acha que os agrônomos têm bastante conhecimentos de agricultura para ensinar e dar conselhos aos agricultores? Sim.....

Não..... Não sabe..... Por que?.....

57. Mão de Obra

Família: O Sr. trabalha parte do ano em outor lugar? Sim.... Não....

Se "sim" por que.....

Qual época do ano?.....Quantos meses?.....

Quantas pessoas de sua casa trabalham com o Sr. no lote durante todo ano?.....Quais as idades dêles.....

Mensalistas: Quantos..... Durante quantos meses por ano?.....

Diaristas: Quantos..... Quantos dias por ano?.....

Quanto paga ao mensalista?..... Ao diarista?.....

58. O Sr. usa animais para cultivar a terra? Sim.... Não.....

Quais o Sr. usa?.....Por que não usa?.....

59. Quais os implementos para usar com animais o Sr. tem?.....

Quais outros implementos e máquinas agrícolas o Sr. tem?.....

.....

60. O Sr. aluga trator para fazer seus serviços? Sim..... Não.....

Por que não .....

Quanto pago por hora?..... Quantos horas por ano?.....

61. Despesas

O Sr. tem idéia de qual foi as despesas totais com relação a adubos, inseticidas, fungicidas, transpórte dos produtos, sementes, (não incluindo mão de obra) durante 1969?.....

62. Crédito

É possível o Sr. conseguir empréstimos no banco ou cooperativa ou a intermediários? Sim..... Não..... A onde?.....

O Sr. já retirou algum empréstimo? Sim..... Não.....

Por que não .....

Se sim, a onde?..... Em que prazo?.....Quanto?.....

Quanto retirou em 1969?.....

63. O Sr. é sócio de cooperativa ou sindicato? Sim..... Nao.....

De que?..... Por que não.....

PERCEPÇÃO DA SITUAÇÃO

64. O Sr. está satisfeito com a assistência que recebeu e está recebendo da administração?.....

65. Quando está em dificuldades quem o Sr. procura para resolver? Padre, administrador, etc.....

66. O Sr. está satisfeito com sua vida na agricultura? Sim.... Não.....

Por que não .....

O Sr. quer deixar a agricultura? Sim..... Não.....

Se sim, O Sr. prefere a. ter um salário certo empregado em outro lugar?..... Ou que o Sr. prefere fazer?.....

67. Aqui o Sr. tem uma escada. Faça de conta que o ALTO da escada (aponte) representa a melhor vida que o Sr. pode ter; o PÉ da escada (aponte) representa a pior vida possível para o Sr.

11

1. Em que degrau da escada o Sr. acha que esta AGORA

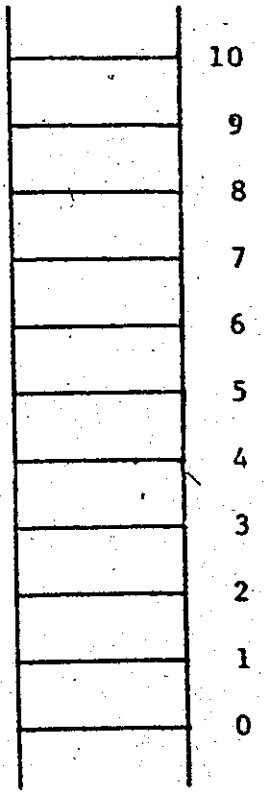
   0 1 2 3 4 5 6 7 8 9 10 Não sabe.....

2. Em que degrau o Sr. acha que estava há CINCO ANOS ATRÁS?

   0 1 2 3 4 5 6 7 8 9 10 Não sabe.....

3. Em que degrau o Sr. acha que estará daqui A CINCO ANOS?

   0 1 2 3 4 5 6 7 8 9 10 Não sabe.....



68. (Ao entrevistador)

Se a mudança foi ou for para pior: Por que?

Antes foi melhor.....

Futuro for pior.....

Futuro melhor: Que pensa fazer?.....

69. Quais os seus maiores problemas e dificuldades?

.....

.....

OBSERVAÇÕES GERAIS

Ao Entrevistador

Faça observações sôbre os seguintes pontos:

1. Especificar o significado da nomenclatura duvidosa utilizada pelo respondente: _____

_____

2. Em relação as respostas dada pelo respondente, você acha que êle conhece agricultura mesmo, ou pouca coisa? _____

_____

3. Em geral, o que você acha sôbre as relações que existem ente o respondente e a administração? _____

_____

4. Situação social do colono em relação a vida na colônia?

_____

5. Tempo de duração do questionário _____ horas

6. Cooperação do respondente _____

_____

7. Solos

Tipo _____

Côr _____

Topografia _____

8. Condições de estradas para transporte _____

9. Distâcia entre o lote e o local da administração? _____

10. Aparência do lote _____

VARIABLE CODE AND DESCRIPTION

QUANTITATIVE VARIABLES

Var.No.	Description	Q.No.*
1	Age of Settler	3
2	Years of Schooling	5
3	Number of Years at the Colony	6
4	Total Number of Children living	7
5	Number of Children living at Home	8
6	Children at Home, Less than 14 Years of Age	9
7	Children at Home, Over 14 Years of Age	9
8	Number of Children Attending School	10
9	Number of Years Spent at Last Employment	18
10	No. of Years in Agric. Working for Himself	24
11	No. of Years in Agric. Working for Others	24
12	Total Number of Years of Agric. Experience	24
13	Area of Land Owned, Rented, or Occupied prior to Settlement.	25
14	Years of Experience Working this Land	25
15	Score: Previous Experience in Growing Crops (3 points for each crop listed in response to question No.25, and 2 points for each crop listed in response to question No.26)	25,26
16	Area in Capoeira or Rough Pasture	42
17	Possession Score, Household Items (0-50)	31
18	Possession Score, Livestock (0-100)	31
19	Possession Score, Tools, Implements (0-50)	31
20	Possession Score, Capital (0-100)	31
21	Composite Possession Score (0-300) (Scores for items 17 to 20 were weighted on a replacement value basis, information was found precarious. Assessment refers to material possessions of settler at the time of his arrival at the colony)	
22	Amount of Annual Payments on Property (cruzeiros)	33

*Number of the question in the interview schedule

QUANTITATIVE VARIABLES (contd.)

Var.No	Description	Q.No.
23	Area Planted First Year After Arrival (ha)	35
24	Area Planted Second Year After Arrival (ha)	35
25	Area Planted Third Year After Arrival (ha)	35
26	Area Planted In 1969 (ha)	35
	(Items 23 to 26 refer to the area settler planted every year and not to his total area under cultivation. E.g.A Settler may have 6ha of sugar cane in a three year cycle, planting only two new ha. every year	
27	Score: Assistance Mechanical (Tractor etc.)0-20	37
28	Score: Assistance,Plants, Seed Material (0-20)	37
29	Score: Assistance, Fertilizer, Insectic.etc(20)	37
30	Score: Assistance, Tools and Equipment (0-10)	37
31	Score: Assistance, Consumption Credit (0-10)	37
32	Score: Assistance, Production Credit (0-20)	37
33	Score: Total (0-100)	
	(Assistance Scores were based upon the quantity, type, and regularity of assistance received by settlers. Information was difficult to elicit and scores provide only a crude index)	
34	Quality of Housing Score (0-100)	40
	(Based upon the following criteria: type of structure, type of roof cover, type of floor, sanitary facilities, ilumination, location and type of water source, number of rooms, and general state of repair of house; five points were deducted for each of the following: lack of privy, lack of washing facilities, and the use of water from rivers or streams for household consumption.	
35	Total Size of Lot (ha)	42
36	Non-Arable Land (ha)	42
37	Total Area of Arable Land (ha)	42
38	Area of Land Normally Under Cultivation (ha)	42
39	Crop One, Total Area (ha) 1969	44
40	Crop One, Gross Value of Product Sold 1969	44

QUANTITATIVE VARIABLES (contd.)

Var. No.	Description	Q.No.
41	Crop Two, Total Area (ha) 1969	44
42	Crop Two, Gross Value of Product Sold 1969 (Cruz.)	44
43	Crop Three, Total Area (ha) 1969	44
44	Crop Three, Gross Value of Product Sold 1969 (Cruz)	44
45	All Other Crops, Area 1969	44
46	All Other Crops, Gross Value of Product Sold 1969	44
47	Gross Income, Crops 1969 (Cruzeiros)	
48	Gross Income, Animals and Animal Products 1969(Cr)	53,54
49	Gross Income, Total, 1969 (Cruzeiros)	
50	Number of Cattle	53
51	Number of Horses, Donkeys	53
52	Number of Goats	53
53	Number of Sheep	53
54	Number of Swine	53
55	Number of Poultry	55
56	Total Value of Animal Inventory, early 1970 (Cruz)	
57	Number of Months Off-Farm Work per Year	57
58	Number of Children Less Than 14 Years of Age Work Year Round on the Property	57
59	Number of Children Over 14, Working Year Round on the Property	57
60	Total Family Labour Force, Man/Years	57
61	Outside Help, Number of Paid Man/Days	57
62	Total Labour Expenses, 1969 (Cruzeiros)	57
63	Total Operating Expenses 1969, including Labour	57,61
64	Amount of Credit Used, 1969 (Cruzeiros)	62
65/22	Amount Annual Payments on Property (Dollars)*	
66/40	Crop One, Gross Value Sold (Dollars)	
67/42	Crop Two, Gross Value Sold (Dollars)	
68/44	Crop Three, Gross Value Sold (Dollars)	
69/46	All Other Crops, Gross Value Sold (Dollars)	
70/47	Gross Income Crops (Dollars)	
71/48	Gross Income, Animals and Animal Products(Dollars)	
72/49	Gross Income,(Dollars)	
73/56	Value of Livestock Inventory (Dollars)	
74/62	Labour Expenses (Dollars)	
75/63	Total Operating Expenses (Dollars)	
76/64	Amount of Credit Used (Dollars)	

*Dollar Values calculated on the basis of U.S.$1.00 = Cr.$4.50

SEVEN COLONIES N = 152

ER NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	46.1974	10.6093	.8605	70.0000	21.0000	49.0000
2	.9013	1.6388	.1329	8.0000	0.0000	8.0000
3	6.6974	4.3840	.3556	27.0000	1.0000	26.0000
4	6.0461	3.5216	.2856	14.0000	0.0000	14.0000
5	4.7368	3.2219	.2613	13.0000	0.0000	13.0000
6	3.1908	2.7374	.2220	11.0000	0.0000	11.0000
7	1.5855	1.8573	.1506	7.0000	0.0000	7.0000
8	1.8882	2.1974	.1782	9.0000	0.0000	9.0000
9	11.2895	8.5472	.6933	40.0000	1.0000	39.0000
10	5.3755	9.2978	.7542	40.0000	0.0000	40.0000
11	13.9474	10.7825	.8746	47.0000	0.0000	47.0000
12	19.4934	10.4552	.8480	50.0000	0.0000	50.0000
13	1.5461	2.2482	.1824	16.0000	0.0000	16.0000
14	8.1579	8.8752	.7199	40.0000	0.0000	40.0000
15	12.2072	7.1990	.5839	75.0000	0.0000	75.0000
16	2.1072	1.4482	.1175	6.0000	0.0000	6.0000
17	9.7697	8.9268	.7241	40.0000	3.0000	37.0000
18	8.8500	16.4922	1.3377	100.0000	0.0000	100.0000
19	9.9737	6.1062	.4854	50.0000	3.0000	47.0000
20	9.2632	7.1509	.5800	50.0000	5.0000	45.0000
21	37.7382	24.7370	2.0064	137.0000	11.0000	126.0000
22	86.8421	145.5759	11.8345	500.0000	0.0000	500.0000
23	1.9684	1.4995	.1216	10.0000	0.0000	10.0000
24	1.9197	1.6329	.1324	10.0000	.5000	9.5000
25	1.6323	1.0059	.0816	6.0000	.5000	5.5000
26	1.7875	1.1520	.0934	7.5000	.5000	7.0000
27	1.5789	3.4247	.2778	15.0000	0.0000	15.0000
28	1.5461	2.8906	.2345	10.0000	0.0000	10.0000
29	3.9474	4.5175	.3664	15.0000	0.0000	15.0000
30	2.3755	2.8142	.2283	10.0000	0.0000	10.0000
31	3.9474	3.3371	.2707	10.0000	0.0000	10.0000
32	6.3158	3.8056	.3087	15.0000	0.0000	15.0000
33	19.6711	12.0522	.9776	60.0000	0.0000	60.0000
34	27.4013	16.8205	1.3643	82.0000	0.0000	82.0000
35	13.3947	7.8800	.6392	30.0000	1.5000	28.5000
36	.3947	1.1197	.0908	7.0000	0.0000	7.0000
37	13.0000	7.7123	.6256	30.0000	1.5000	28.5000
38	5.2895	7.6177	.2934	27.0000	1.0000	26.0000
39	2.5727	2.4183	.1962	15.0000	.2000	14.8000
40	1471.9224	2132.9241	173.0030	16000.0000	0.0000	16000.0000
41	1.0[illegible]	1.7311	.1404	20.0000	0.0000	20.0000
42	274.4632	538.9595	43.7154	3438.0000	0.0000	3438.0000
43	.5145	.5033	.0408	3.0000	0.0000	3.0000
44	143.9211	442.5908	35.8989	5000.0000	0.0000	5000.0000
45	.5755	.6718	.0545	4.5000	0.0000	4.5000
46	25[illegible].5132	1617.6325	131.2073	19500.0000	0.0000	19500.0000
47	23[illegible].0172	3043.5766	245.8667	22500.0000	100.0000	22400.0000
48	144.3742	685.4862	55.6[illegible]	7600.0000	0.0000	7600.0000
49	[illegible]	[illegible]	251.4133	22500.0000	100.0000	224[illegible]
50	.9803	2.4535	.1990	20.0000	0.0000	20.0000
51	.8947	1.0174	.0825	5.0000	0.0000	5.0000
52	.5987	1.5580	.1264	10.0000	0.0000	10.0000
53	.1842	.9309	.0755	6.0000	0.0000	6.0000
54	.2171	.7180	.0582	4.0000	0.0000	4.0000
55	18.7237	91.9029	7.4543	900.0000	0.0000	900.0000
56	344.9803	646.2121	52.4147	5150.0000	0.0000	5150.0000
57	.3684	1.1199	.0908	6.0000	0.0000	6.0000
58	.4079	.7836	.0636	4.0000	0.0000	4.0000
59	1.3421	1.3815	.1121	6.0000	0.0000	6.0000
60	1.6234	1.0452	.0848	5.2500	.2500	5.0000
61	39.6447	305.6746	24.7935	3600.0000	0.0000	3600.0000
62	315.2632	793.8088	64.3804	9000.0000	0.0000	9000.0000
63	839.7757	1766.3695	143.2715	17000.0000	0.0000	17000.0000
64	[illegible]	804.1595	65.2260	4500.0000	0.0000	4500.0000
65	19.7951	32.3411	2.6232	111.1100	0.0000	111.1100
66	[illegible]	[illegible]	[illegible]	3555.2200	0.0000	3555.2200
67	60.9912	119.7676	9.7144	763.9924	0.0000	763.9924
68	31.9821	98.3525	7.9774	1111.1000	0.0000	1111.1000
69	55.6693	359.4703	29.1569	4333.2900	0.0000	4333.2900
70	571.1857	676.3436	54.4547	4999.9500	22.2220	4977.7280
71	30.6517	152.3288	12.3555	1688.8720	0.0000	1698.8720
72	[illegible]	688.8000	55.8591	4999.9500	22.2220	4977.7280
73	76.6619	143.6012	11.6470	1144.4330	0.0000	1144.4330
74	78.0578	176.4002	14.3079	1999.9800	0.0000	1999.9800
75	147.6371	392.5226	31.8378	3777.7400	0.0000	3777.7400
76	[illegible]	[illegible]	14.4049	999.9900	0.0000	999.9900

CAMARATUBA, N = 9

VAR NO.	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	53.2222	8.9830	2.9943	65.0000	38.0000	27.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	16.3333	8.5440	2.8480	27.0000	2.0000	25.0000
4	4.4444	3.5040	1.1680	11.0000	0.0000	11.0000
5	2.7778	2.4381	.8127	7.0000	0.0000	7.0000
6	2.0000	2.1213	.7071	6.0000	0.0000	6.0000
7	.8889	.9280	.3093	2.0000	0.0000	2.0000
8	1.0000	1.4142	.4714	4.0000	0.0000	4.0000
9	19.1111	11.9629	3.9876	40.0000	2.0000	38.0000
10	12.0000	15.1575	5.0525	40.0000	0.0000	40.0000
11	5.1111	7.0079	2.3360	20.0000	0.0000	20.0000
12	17.1111	12.3839	4.1280	40.0000	0.0000	40.0000
13	1.9444	2.0378	.6793	6.0000	0.0000	6.0000
14	13.3333	14.3091	4.7697	40.0000	0.0000	40.0000
15	13.5000	5.8843	1.9614	21.5000	4.0000	17.5000
16	3.1778	1.3236	.4412	5.2000	1.7000	3.5000
17	7.3333	5.8310	1.9437	22.0000	3.0000	19.0000
18	11.5667	15.9956	5.3319	40.0000	0.0000	40.0000
19	13.0000	3.8730	1.2910	15.0000	3.0000	12.0000
20	11.6667	7.0711	2.3570	25.0000	5.0000	20.0000
21	43.5667	23.1308	7.7103	90.0000	23.0000	67.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	2.5556	1.0138	.3379	4.0000	1.0000	3.0000
24	2.2222	.7949	.2650	4.0000	1.5000	2.5000
25	1.6111	.9610	.3203	3.5000	1.0000	2.5000
26	2.1667	1.1726	.3909	4.0000	1.0000	3.0000
27	2.2222	3.6324	1.2108	10.0000	0.0000	10.0000
28	.5556	1.6667	.5556	5.0000	0.0000	5.0000
29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	.5556	1.6667	.5556	5.0000	0.0000	5.0000
32	1.6667	3.5355	1.1785	10.0000	0.0000	10.0000
33	5.0000	5.5902	1.8634	15.0000	0.0000	15.0000
34	35.1111	3.8873	1.2958	42.0000	30.0000	12.0000
35	10.0000	0.0000	0.0000	10.0000	10.0000	0.0000
36	.1111	.3333	.1111	1.0000	0.0000	1.0000
37	9.8889	.3333	.1111	10.0000	9.0000	1.0000
38	3.5556	1.0138	.3379	5.0000	2.0000	3.0000
39	1.7[illegible]	.9526	.3175	4.0000	.8000	3.2000
40	[illegible]	479.2703	159.7568	1500.0000	0.0000	1500.0000
41	.9778	.4604	.1535	2.0000	.5000	1.5000
42	38.8889	116.6667	38.8889	350.0000	0.0000	350.0000
43	.4222	.1563	.0521	.5000	.1000	.4000
44	68.8889	117.0945	39.0315	320.0000	0.0000	320.0000
45	.5111	.4859	.1620	1.4000	0.0000	1.4000
46	57.5556	77.6114	25.8705	220.0000	0.0000	220.0000
47	752.7778	479.1993	159.7331	1850.0000	200.0000	1650.0000
48	[illegible]	613.7589	204.5863	1900.0000	0.0000	1900.0000
49	[illegible]	610.5519	203.5173	2100.0000	640.0000	1460.0000
50	4.6667	5.9791	1.9930	20.0000	0.0000	20.0000
51	1.5556	.8819	.2940	3.0000	0.0000	3.0000
52	.3333	.7071	.2357	2.0000	0.0000	2.0000
53	.1111	.3333	.1111	1.0000	0.0000	1.0000
54	.8889	1.4530	.4843	4.0000	0.0000	4.0000
55	17.2222	17.1594	5.7198	50.0000	0.0000	50.0000
56	1351.1111	1499.5286	499.8429	5150.0000	70.0000	5080.0000
57	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	.4444	.7265	.2422	2.0000	0.0000	2.0000
59	.7778	.8333	.2778	2.0000	0.0000	2.0000
60	1.4222	.7190	.2397	2.8000	.7500	2.0500
61	47.2222	59.2419	23.3866	230.0000	0.0000	230.0000
62	150.0000	207.7258	69.2419	600.0000	0.0000	600.0000
63	211.1111	181.6896	60.5632	600.0000	0.0000	600.0000
64	44.4444	133.3333	44.4444	400.0000	0.0000	400.0000
65	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
66	119.6254	106.5034	35.5011	333.3300	0.0000	333.3300
67	[illegible].6419	25.9257	8.6419	77.7770	0.0000	77.7770
68	15.3[illegible]	26.0207	8.6736	71.1104	0.0000	71.1104
69	12.7900	17.2468	5.7489	48.8884	0.0000	48.8884
70	167.2823	106.4877	35.4959	411.1070	44.4440	[illegible]
71	130.7397	136.3895	45.4632	422.2180	0.0000	422.2180
72	[illegible]	135.6768	45.2256	466.6620	142.2208	324.4412
73	[illegible]	333.2253	111.0751	1144.4330	15.5554	1128.8776
74	33.3730	46.1608	15.3869	133.3320	0.0000	133.3320
75	[illegible]	40.3751	13.4584	133.3320	0.0000	[illegible]
76	[illegible]	29.[illegible]	9.87[illegible]	[illegible]	[illegible]	[illegible]

CRC CABO N = 32

VAR NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	47.4687	9.5139	1.6818	68.0000	28.0000	40.0000
2	.8125	1.2297	.2174	5.0000	0.0000	5.0000
3	4.6250	1.5187	.2685	8.0000	2.0000	6.0000
4	7.1563	3.8697	.6841	14.0000	1.0000	13.0000
5	5.5938	3.5998	.6364	13.0000	0.0000	13.0000
6	3.2188	2.6969	.4767	9.0000	0.0000	9.0000
7	2.3750	2.3383	.4134	7.0000	0.0000	7.0000
8	1.9375	2.5645	.4533	9.0000	0.0000	9.0000
9	11.5625	9.5948	1.6961	40.0000	1.0000	39.0000
10	4.5313	8.8244	1.5599	33.0000	0.0000	33.0000
11	16.2187	12.5383	2.2165	47.0000	0.0000	47.0000
12	20.7500	11.5032	2.0335	47.0000	0.0000	47.0000
13	1.2875	1.3760	.2432	6.0000	0.0000	6.0000
14	8.2500	8.6360	1.5266	32.0000	0.0000	32.0000
15	12.7031	6.6306	1.1721	21.5000	0.0000	21.5000
16	1.5000	1.2080	.2136	4.0000	0.0000	4.0000
17	14.5938	12.0960	2.1383	40.0000	3.0000	37.0000
18	10.0937	18.1594	3.2102	90.0000	0.0000	90.0000
19	14.5000	7.7668	1.3730	50.0000	3.0000	47.0000
20	11.4062	9.6916	1.7132	50.0000	5.0000	45.0000
21	50.5937	30.7171	5.4301	137.0000	11.0000	126.0000
22	285.3125	133.5129	23.6020	500.0000	0.0000	500.0000
23	2.0156	1.2358	.2185	5.0000	0.0000	5.0000
24	1.6125	1.0276	.1817	5.0000	.5000	4.5000
25	1.7063	.7509	.1327	3.5000	.5000	3.0000
26	1.6187	.7036	.1244	3.0000	.5000	2.5000
27	.9375	2.3546	.4162	10.0000	0.0000	10.0000
28	.3125	1.2297	.2174	5.0000	0.0000	5.0000
29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	2.9687	3.3262	.5880	10.0000	0.0000	10.0000
31	3.7500	2.5400	.4490	10.0000	0.0000	10.0000
32	7.9687	4.1851	.7398	15.0000	0.0000	15.0000
33	15.9375	8.7471	1.5463	35.0000	0.0000	35.0000
34	27.2187	13.2366	2.3399	51.0000	2.0000	49.0000
35	10.3906	1.9416	.3432	15.0000	7.0000	8.0000
36	.3594	.6505	.1150	3.0000	0.0000	3.0000
37	10.0313	1.8963	.3352	15.0000	5.5000	9.5000
38	6.0469	2.4638	.4355	10.0000	2.0000	8.0000
39	3.7687	2.2205	.3925	9.0000	1.0000	8.0000
40	2193.1281	1851.9401	327.3798	7000.0000	0.0000	7000.0000
41	1.0775	.6651	.1176	3.0000	0.0000	3.0000
42	300.3469	327.6587	57.9224	1125.0000	0.0000	1125.0000
43	.5687	.4177	.0738	2.0000	0.0000	2.0000
44	316.4375	876.0985	154.8738	5000.0000	0.0000	5000.0000
45	.4094	.4106	.0726	2.0000	0.0000	2.0000
46	139.6875	741.4915	131.0784	4200.0000	0.0000	4200.0000
47	2970.8437	3016.3905	533.2275	17000.0000	300.0000	16700.0000
48	65.0000	145.1362	25.6567	500.0000	0.0000	500.0000
49	3075.8438	3087.6625	545.8268	17500.0000	300.0000	17200.0000
50	1.0312	2.2928	.4053	9.0000	0.0000	9.0000
51	1.1563	.8076	.1428	3.0000	0.0000	3.0000
52	.4688	1.1635	.2057	5.0000	0.0000	5.0000
53	.4063	1.3164	.2327	5.0000	0.0000	5.0000
54	.0313	.1768	.0313	1.0000	0.0000	1.0000
55	6.2812	7.7094	1.3628	22.0000	0.0000	22.0000
56	307.0312	460.9367	81.4829	2150.0000	0.0000	2150.0000
57	.7187	1.6893	.2986	6.0000	0.0000	6.0000
58	.2612	.6342	.1121	2.0000	0.0000	2.0000
59	1.8125	1.4906	.2635	6.0000	0.0000	6.0000
60	2.0969	1.1029	.1950	5.0000	.2500	4.7500
61	115.1875	141.1893	24.9590	700.0000	0.0000	700.0000
62	390.9375	452.3531	79.9655	2200.0000	0.0000	2200.0000
63	1081.8125	2162.1088	382.2105	12130.0000	0.0000	12130.0000
64	690.6250	959.5595	169.6985	4500.0000	0.0000	4500.0000
65	63.4021	29.6692	5.2448	111.1100	0.0000	111.1100
66	407.3550	411.5381	72.7504	1555.5400	0.0000	1555.5400
67	71.3206	72.8123	12.8715	249.9975	0.0000	249.9975
68	70.3187	194.6866	34.4161	1111.1000	0.0000	1111.1000
69	31.0414	164.7742	29.1282	933.3240	0.0000	933.3240
70	650.1839	670.3023	118.4938	3777.7400	66.6660	3711.0740
71	14.4443	32.2522	5.7014	111.1100	0.0000	111.1100
72	674.6252	686.1404	121.2936	3889.8500	66.6660	3822.1840
73	68.2765	102.4294	18.1071	477.7730	0.0000	477.7730
74	86.8741	100.5219	17.7699	488.8840	0.0000	488.8840
75	240.4304	480.4638	84.9348	2695.5286	0.0000	2695.5286
76	[illegible]	[illegible]	37.7104	999.9900	0.0000	999.9900

CRC VITORIA N = 6

VAR NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	40.6667	8.8694	3.6209	50.0000	31.0000	19.0000
2	2.1667	2.0412	.8333	5.0000	0.0000	5.0000
3	5.8333	2.5626	1.0462	8.0000	1.0000	7.0000
4	6.1667	4.0208	1.6415	11.0000	0.0000	11.0000
5	5.8333	3.6560	1.4926	10.0000	0.0000	10.0000
6	3.1667	2.7869	1.1377	7.0000	0.0000	7.0000
7	2.6667	3.0111	1.2293	6.0000	0.0000	6.0000
8	1.6667	1.6330	.6667	4.0000	0.0000	4.0000
9	14.3333	9.0921	3.7118	30.0000	4.0000	26.0000
10	.5000	1.2247	.5000	3.0000	0.0000	3.0000
11	17.1667	9.5795	3.9108	30.0000	5.0000	25.0000
12	17.6667	9.3310	3.8093	30.0000	5.0000	25.0000
13	2.3333	2.2730	.9280	6.0000	0.0000	6.0000
14	13.3333	10.8012	4.4096	30.0000	0.0000	30.0000
15	23.5000	25.6437	10.4690	75.0000	7.5000	67.5000
16	1.4667	1.0558	.4310	3.0000	0.0000	3.0000
17	10.8333	7.7050	3.1455	22.0000	3.0000	19.0000
18	21.7500	38.9021	15.8817	100.0000	0.0000	100.0000
19	10.3333	6.0553	2.4721	16.0000	3.0000	13.0000
20	9.1667	10.2062	4.1667	30.0000	5.0000	25.0000
21	92.0833	34.9549	14.2703	122.0000	30.0000	92.0000
22	308.3333	20.4124	8.3333	350.0000	300.0000	50.0000
23	1.5000	.8367	.3416	3.0000	.5000	2.5000
24	2.2500	2.3611	.9639	7.0000	1.0000	6.0000
25	1.5000	1.0000	.4082	3.0000	.5000	2.5000
26	1.6667	.7528	.3073	3.0000	1.0000	2.0000
27	5.0000	6.3246	2.5820	15.0000	0.0000	15.0000
28	1.6667	2.5820	1.0541	5.0000	0.0000	5.0000
29	3.3333	4.0825	1.6667	10.0000	0.0000	10.0000
30	6.6667	2.5820	1.0541	10.0000	5.0000	5.0000
31	3.3333	2.5820	1.0541	5.0000	0.0000	5.0000
32	4.1667	3.7639	1.5366	10.0000	0.0000	10.0000
33	24.1667	11.5830	4.7288	40.0000	10.0000	30.0000
34	51.3333	12.7384	5.2004	70.0000	38.0000	32.0000
35	10.0000	0.0000	0.0000	10.0000	10.0000	0.0000
36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	10.0000	0.0000	0.0000	10.0000	10.0000	0.0000
38	6.2500	1.9937	.8139	10.0000	5.0000	5.0000
39	3.[illegible]	1.7889	.7303	5.0000	1.0000	4.0000
40	996.6667	555.7937	226.9018	1860.0000	180.0000	1680.0000
41	.[illegible]	.6595	.2693	2.0000	.1000	1.9000
42	216.6667	198.0572	80.8565	500.0000	0.0000	500.0000
43	.5000	.3937	.1607	1.0000	0.0000	1.0000
44	60.8333	98.0009	40.0087	225.0000	0.0000	225.0000
45	.8333	.7062	.2883	2.0000	.1000	1.9000
46	208.3333	352.7275	144.0004	900.0000	0.0000	900.0000
47	1482.5000	592.2141	241.7704	2130.0000	770.0000	1360.0000
48	[illegible]	3064.3095	1251.2440	7600.0000	0.0000	7600.0000
49	[illegible]	[illegible]	1341.8419	9410.[illegible]	77[illegible]	8630.[illegible]
50	2.[illegible]	1.9745	.8062	6.0000	0.0000	6.0000
51	.8333	.7528	.3073	2.0000	0.0000	2.0000
52	1.3333	1.9664	.8028	5.0000	0.0000	5.0000
53	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	267.6667	417.1722	170.3098	900.0000	0.0000	900.0000
56	1055.0000	480.9054	196.3288	1750.0000	570.0000	1180.0000
57	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	.1667	.4082	.1667	1.0000	0.0000	1.0000
59	2.6667	2.3381	.9545	6.0000	0.0000	6.0000
60	2.9167	1.6558	.6760	5.2500	1.0000	4.2500
61	[illegible]	100.1998	40.9064	300.0000	40.0000	260.0000
62	[illegible]	300.5994	122.7192	900.0000	120.0000	780.0000
63	[illegible]	593.2959	242.2120	1500.0000	150.0000	1350.0000
64	170.[illegible]	160.2082	65.4047	400.0000	0.0000	400.0000
65	[illegible].5178	4.5360	1.8518	77.7770	66.6660	11.1110
66	[illegible]	123.[illegible]	50.4221	413.3292	39.9996	373.3296
67	48.1477	44.0123	17.9679	111.1100	0.0000	111.1100
68	13.5194	21.7777	8.8907	49.9995	0.0000	49.9995
69	[illegible].2958	78.3831	31.9998	199.9980	0.0000	199.9980
70	329.4412	131.6018	53.7262	473.3286	171.1094	302.2192
71	[illegible]	681.2342	278.0515	1688.8720	0.0000	1688.8720
72	630.5493	730.3989	298.1841	2088.8680	171.1094	1917.7586
73	[illegible]	106.6668	43.0282	388.8850	126.6654	262.2196
74	65.[illegible]	66.7992	27.2707	199.9980	26.6664	173.3316
75	144.4433	131.8422	53.8244	333.3300	33.3330	299.9970
76	[illegible]	35.6015	14.5342	38.8880	0.0000	38.8880

TIRIRI N = 29

VAR NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	49.2759	10.2570	1.9047	69.0000	31.0000	38.0000
2	.7931	1.6771	.3114	5.0000	0.0000	5.0000
3	4.2069	3.1211	.5796	12.0000	1.0000	11.0000
4	6.1379	3.3351	.6193	12.0000	0.0000	12.0000
5	4.7931	3.2335	.6004	11.0000	0.0000	11.0000
6	3.6552	2.9674	.5510	11.0000	0.0000	11.0000
7	1.3443	1.5874	.2948	5.0000	0.0000	5.0000
8	2.1724	2.4795	.4604	9.0000	0.0000	9.0000
9	13.6897	9.2894	1.7250	30.0000	1.0000	29.0000
10	4.4138	7.8627	1.4601	30.0000	0.0000	30.0000
11	18.9310	11.2755	2.0938	40.0000	0.0000	40.0000
12	23.3443	8.5619	1.5899	40.0000	5.0000	35.0000
13	1.2862	1.9555	.3631	8.0000	0.0000	8.0000
14	11.1724	9.4380	1.7526	30.0000	0.0000	30.0000
15	12.9655	3.2347	.6007	18.0000	6.0000	12.0000
16	1.4724	.9085	.1687	4.0000	0.0000	4.0000
17	9.9655	8.6952	1.6147	30.0000	3.0000	27.0000
18	10.7241	11.7592	2.1836	50.0000	0.0000	50.0000
19	13.0690	4.8250	.8960	20.0000	3.0000	17.0000
20	7.2414	5.2757	.9797	25.0000	5.0000	20.0000
21	40.6552	19.2841	3.5810	98.0000	11.0000	87.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	1.6379	.8368	.1554	4.0000	.5000	3.5000
24	1.6310	.8290	.1539	3.5000	.5000	3.0000
25	1.7000	.9706	.1802	4.5000	.5000	4.0000
26	1.7310	1.4021	.2604	7.5000	.5000	7.0000
27	.8621	2.6956	.5006	10.0000	0.0000	10.0000
28	.6897	1.7547	.3258	5.0000	0.0000	5.0000
29	1.5517	2.7070	.5027	10.0000	0.0000	10.0000
30	.3448	1.2894	.2394	5.0000	0.0000	5.0000
31	2.9310	2.5062	.4654	10.0000	0.0000	10.0000
32	4.1379	2.3410	.4347	35.0000	0.0000	35.0000
33	10.5172	7.1145	1.3211	48.0000	0.0000	48.0000
34	18.1379	11.4353	2.1235	20.0000	6.0000	14.0000
35	9.4655	3.0704	.5702	1.0000	0.0000	1.0000
36	.2069	.3900	.0724	19.0000	6.0000	13.0000
37	9.2586	3.0196	.5607	17.0000	1.0000	16.0000
38	5.1552	3.5130	.6523	15.0000	.5000	14.5000
39	[illegible]	3.2382	.6013	16000.0000	0.0000	16000.0000
40	2974.[illegible]	3753.[illegible]	697.0694	4.0000	.1000	3.9000
41	.6[illegible]	.7592	.1410	2400.0000	0.0000	2400.0000
42	223.7931	491.0061	91.1775	1.0000	0.0000	1.0000
43	.2172	.2377	.0441	360.0000	0.0000	360.0000
44	38.2759	99.0696	18.3968	.5000	0.0000	.5000
45	.1310	.1775	.0330	200.0000	0.0000	200.0000
46	18.2759	55.1665	10.2442	18760.0000	100.0000	18660.0000
47	3439.3793	4058.9864	753.7200	630.0000	0.0000	630.0000
48	56.[illegible]	144.[illegible]	26.9285	18760.0000	100.0000	18660.0000
49	3461.72[illegible]	4097.[illegible]	760.[illegible]	6.0000	0.0000	6.0000
50	.8621	1.5974	.2966	3.0000	0.0000	3.0000
51	.9655	.9056	.1682	10.0000	0.0000	10.0000
52	1.7586	2.8241	.5244	0.0000	0.0000	0.0000
53	0.0000	0.0000	0.0000	3.0000	0.0000	3.0000
54	.1379	.5809	.1079	20.0000	0.0000	20.0000
55	2.3[illegible]	4.8263	.8962	1700.0000	0.0000	1700.0000
56	334.8276	433.4300	80.4859	3.0000	0.0000	3.0000
57	.4138	1.0528	.1955	4.0000	0.0000	4.0000
58	.6552	1.1425	.2122	4.0000	0.0000	4.0000
59	1.2759	1.2506	.2322	3.7500	.2500	3.5000
60	1.7965	.9348	.1736	300.0000	0.0000	300.0000
61	88.2759	93.2764	17.3210	1200.0000	0.0000	1200.0000
62	344.1379	374.8025	69.5991	3000.0000	0.0000	3000.0000
63	722.5172	800.6584	148.6785	440.0000	0.0000	440.0000
64	103.7931	92.6365	17.2022	0.0000	0.0000	0.0000
65	0.0000	0.0000	0.0000	3555.5200	0.0000	3555.5200
66	660.4899	834.1722	154.9019	533.3280	0.0000	533.3280
67	49.7312	109.1114	20.2615	79.9992	0.0000	79.9992
68	8.5057	22.0152	4.0881	44.4440	0.0000	44.4440
69	4.[illegible]	12.2591	2.2765	4168.8472	22.2220	4146.6252
70	757.[illegible]	901.9702	167.4917	133.3320	0.0000	133.3320
71	13.0767	32.2012	5.9796	4168.8472	22.2220	4146.6252
72	769.2797	910.5735	169.0893	377.7740	0.0000	377.7740
73	74.4[illegible]	96.3168	17.8856	266.6640	0.0000	266.6640
74	76.4743	83.2866	15.4663	666.6600	0.0000	666.66[illegible]
75	[illegible]	17[illegible]	[illegible]	97.7768	0.0000	97.7[illegible]
76	[illegible]	[illegible]	[illegible]			

RIO BONITO N = 7

VAR NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	43.7143	10.4994	3.9684	58.0000	30.0000	28.0000
2	2.1429	1.8645	.7047	6.0000	0.0000	6.0000
3	7.5714	2.1492	.8123	9.0000	3.0000	6.0000
4	5.1429	2.1157	.7997	7.0000	2.0000	5.0000
5	4.0000	2.1602	.8165	7.0000	1.0000	6.0000
6	3.0000	2.2361	.8452	6.0000	0.0000	6.0000
7	.8571	1.0690	.4041	3.0000	0.0000	3.0000
8	2.4286	1.5119	.5714	4.0000	0.0000	4.0000
9	9.0000	3.6056	1.3628	14.0000	4.0000	10.0000
10	10.1429	12.4690	4.7128	30.0000	0.0000	30.0000
11	7.0000	6.6583	2.5166	20.0000	0.0000	20.0000
12	18.1429	8.6685	3.2764	30.0000	5.0000	25.0000
13	1.3571	1.6511	.6241	4.0000	0.0000	4.0000
14	5.7143	5.5592	2.1012	13.0000	0.0000	13.0000
15	15.8571	2.2678	.8571	20.0000	13.0000	7.0000
16	2.2143	1.2838	.4852	4.0000	.4000	3.6000
17	12.8571	7.9042	2.9875	27.0000	3.0000	24.0000
18	14.2857	28.0518	10.6026	77.0000	0.0000	77.0000
19	13.5714	5.5635	2.1028	20.0000	5.0000	15.0000
20	10.0000	9.1287	3.4503	30.0000	5.0000	25.0000
21	50.7143	37.2680	14.0860	129.0000	24.0000	105.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	1.8571	1.9086	.7214	6.0000	.5000	5.5000
24	1.2857	.5669	.2143	2.0000	.5000	1.5000
25	1.0000	.5774	.2182	2.0000	.5000	1.5000
26	2.5714	1.5392	.5818	5.0000	.5000	4.5000
27	10.7143	4.4987	1.7003	15.0000	5.0000	10.0000
28	5.0000	5.0000	1.8898	10.0000	0.0000	10.0000
29	6.4286	3.7796	1.4286	10.0000	0.0000	10.0000
30	2.1429	2.6726	1.0102	5.0000	0.0000	5.0000
31	5.7143	3.4503	1.3041	10.0000	0.0000	10.0000
32	7.1429	3.9340	1.4869	10.0000	0.0000	10.0000
33	37.1429	16.7971	6.3487	60.0000	10.0000	50.0000
34	35.7143	7.7828	2.9416	45.0000	24.0000	21.0000
35	21.4286	6.0994	2.3053	25.0000	12.5000	12.5000
36	2.2143	2.3427	.8854	5.0000	0.0000	5.0000
37	19.2143	6.8669	2.5955	25.0000	7.5000	17.5000
38	4.2143	2.5958	.9811	9.0000	2.0000	7.0000
39	1.5000	.5774	.2182	2.5000	1.0000	1.5000
40	767.2857	674.4367	254.9131	2000.0000	0.0000	2000.0000
41	1.0000	.5774	.2182	2.0000	.5000	1.5000
42	557.1571	1097.1289	414.6758	3000.0000	0.0000	3000.0000
43	.7857	.6842	.2586	2.0000	.2000	1.8000
44	162.8571	222.2397	83.9987	600.0000	0.0000	600.0000
45	.7286	.7319	.2766	2.0000	0.0000	2.0000
46	2990.0000	7283.5911	2752.9387	19500.0000	0.0000	19500.0000
47	4477.0000	7965.5422	3010.6920	22500.0000	716.0000	21784.0000
48	715.5714	646.3340	244.2913	1750.0000	0.0000	1750.0000
49	[illegible]	7817.4846	2954.7314	22500.0000	1110.0000	21390.0000
50	1.5714	4.1576	1.5714	11.0000	0.0000	11.0000
51	.8571	1.8645	.7047	5.0000	0.0000	5.0000
52	.2857	.4880	.1844	1.0000	0.0000	1.0000
53	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	.1429	.3780	.1429	1.0000	0.0000	1.0000
55	17.1429	13.8013	5.2164	30.0000	0.0000	30.0000
56	527.1429	1137.5517	429.9541	3100.0000	0.0000	3100.0000
57	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	.8571	.8997	.3401	2.0000	0.0000	2.0000
59	.5714	.7868	.2974	2.0000	0.0000	2.0000
60	1.3571	.5175	.1956	2.2500	.7500	1.5000
61	[illegible]	1313.4762	496.6363	3600.0000	0.0000	3600.0000
62	1021.4286	3282.0935	1240.4908	9000.0000	0.0000	9000.0000
63	3064.2857	6179.3823	2335.5369	17000.0000	250.0000	16750.0000
64	1514.2857	1803.1718	681.5349	4000.0000	0.0000	4000.0000
65	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
66	[illegible]	149.8733	56.6468	444.4400	0.0000	444.4400
67	[illegible]	243.8040	92.1492	666.6600	0.0000	666.6600
68	70.1901	49.3861	18.6662	133.3320	0.0000	133.3320
69	664.6778	1618.5596	611.7580	4333.2900	0.0000	4333.2900
70	[illegible]	1770.1028	669.0360	4999.9500	159.1095	4840.8405
71	70.7929	143.6283	54.2864	388.8850	0.0000	388.8850
72	1077.2008	1737.2014	656.6064	4999.9500	246.6642	4753.2858
73	117.1417	252.7867	95.5444	688.8820	0.0000	688.8820
74	360.3139	729.3203	275.6596	1999.9800	0.0000	1999.9800
75	[illegible]	[illegible]	519.0141	3777.7400	55.5550	3722.1850
76	[illegible]	[illegible]	151.4907	888.8800	0.0000	888.8800

PINDORAMA N = 42

VAR NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	43.8333	11.2270	1.7324	70.0000	21.0000	49.0000
2	.9286	1.6732	.2582	8.0000	0.0000	8.0000
3	8.2143	3.2047	.4945	13.0000	1.0000	12.0000
4	5.5714	3.4368	.5303	12.0000	0.0000	12.0000
5	4.7143	3.1875	.4918	11.0000	0.0000	11.0000
6	3.2381	3.0025	.4633	9.0000	0.0000	9.0000
7	1.4762	1.6710	.2578	6.0000	0.0000	6.0000
8	1.7381	1.9514	.3011	7.0000	0.0000	7.0000
9	9.6905	7.2499	1.1187	30.0000	1.0000	29.0000
10	3.5476	7.6196	1.1757	30.0000	0.0000	30.0000
11	12.8333	9.4428	1.4571	40.0000	0.0000	40.0000
12	16.8571	10.5219	1.6236	50.0000	1.0000	49.0000
13	2.0000	3.2516	.5017	16.0000	0.0000	16.0000
14	5.0476	7.8241	1.2073	30.0000	0.0000	30.0000
15	10.6548	4.8721	.7518	17.0000	2.0000	15.0000
16	2.8143	1.2040	.1858	6.0000	.5000	5.5000
17	5.2619	4.7476	.7326	22.0000	3.0000	19.0000
18	6.6667	15.1491	2.3376	79.0000	0.0000	79.0000
19	5.5238	2.4913	.3844	15.0000	3.0000	12.0000
20	8.0476	4.9236	.7597	20.0000	5.0000	15.0000
21	25.5714	18.2692	2.8190	101.0000	11.0000	90.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	2.6286	2.0916	.3227	10.0000	.5000	9.5000
24	2.6071	2.5460	.3929	10.0000	.5000	9.5000
25	1.8333	1.3454	.2076	6.0000	.5000	5.5000
26	1.8690	1.3927	.2149	7.0000	.5000	6.5000
27	.8333	1.8860	.2910	5.0000	0.0000	5.0000
28	3.0952	3.6547	.5639	10.0000	0.0000	10.0000
29	5.8333	4.2651	.6581	10.0000	0.0000	10.0000
30	2.7381	2.5189	.3887	5.0000	0.0000	5.0000
31	2.6190	2.7582	.4256	10.0000	0.0000	10.0000
32	5.7143	3.2331	.4989	10.0000	0.0000	10.0000
33	20.8333	9.8102	1.5137	40.0000	0.0000	40.0000
34	24.5714	20.4369	3.1535	82.0000	0.0000	82.0000
35	23.4762	5.4291	.8377	30.0000	10.0000	20.0000
36	.6190	1.6072	.2480	7.0000	0.0000	7.0000
37	22.8571	5.8124	.8969	30.0000	8.0000	22.0000
38	6.9643	4.8945	.7552	27.0000	1.0000	26.0000
39	3.0619	2.4193	.3733	11.0000	.2000	10.8000
40	1111.8095	1231.5789	190.0306	6000.0000	0.0000	5000.0000
41	1.9286	3.0308	.4677	20.0000	0.0000	20.0000
42	279.4286	750.2750	115.7599	3433.0000	0.0000	3438.0000
43	.7881	.6608	.1020	3.0000	0.0000	3.0000
44	120.2381	227.4084	35.0899	1000.0000	0.0000	1000.0000
45	.9252	.9698	.1496	4.5000	0.0000	4.5000
46	146.1905	249.8776	38.5569	1300.0000	0.0000	1300.0000
47	1742.6667	1695.5908	261.6353	8440.0000	200.0000	8240.0000
48	157.8571	397.6304	61.3557	1900.0000	0.0000	1900.0000
49	[illegible]	1660.8181	256.2698	8440.0000	200.0000	8240.0000
50	.5000	1.4857	.2292	7.0000	0.0000	7.0000
51	1.0000	1.1894	.1835	5.0000	0.0000	5.0000
52	.2657	.6730	.1038	2.0000	0.0000	2.0000
53	.2857	1.2932	.1996	6.0000	0.0000	6.0000
54	.3810	.9866	.1522	4.0000	0.0000	4.0000
55	9.2857	12.4259	1.9174	50.0000	0.0000	50.0000
56	225.2381	456.5098	70.4410	2140.0000	0.0000	2140.0000
57	.1667	.6214	.0959	3.0000	0.0000	3.0000
58	.3095	.7153	.1104	3.0000	0.0000	3.0000
59	1.2381	1.3935	.2150	5.0000	0.0000	5.0000
60	1.7381	1.0987	.1695	4.7500	.5000	4.2500
61	60.4762	101.5478	15.6692	360.0000	0.0000	360.0000
62	186.4524	311.7760	48.1081	1080.0000	0.0000	1080.0000
63	648.4290	825.1648	127.3257	4000.0000	0.0000	4000.0000
64	555.2473	574.4386	88.6378	2900.0000	0.0000	2900.0000
65	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
66	[illegible]	273.6726	42.2266	1333.3200	0.0000	1333.3200
67	84.3166	166.7261	25.7264	763.9924	0.0000	763.9924
68	26.7193	50.5347	7.7977	222.2200	0.0000	222.2200
69	72.4864	55.5278	8.5681	288.8860	0.0000	248.8860
70	387.2964	376.7947	58.1406	1875.5368	44.4440	1531.0928
71	75.0790	88.3614	13.6345	422.2180	0.0000	422.2180
72	470.2140	369.8670	56.9483	1875.5368	44.4440	1831.0928
73	50.0924	101.4656	15.6534	475.5508	0.0000	475.5508
74	41.5779	69.2829	10.6906	239.9976	0.0000	239.9976
75	144.3043	183.7681	28.2943	888.8800	0.0000	888.8800
76	[illegible]	127.6547	19.6971	644.4380	0.0000	644.4380

TREZE N = 27

VAR NO	MEAN	S.D.	S.E. OF MEAN	MAXIMUM	MINIMUM	RANGE
1	44.5926	10.8743	2.0928	62.0000	24.0000	38.0000
2	.7778	1.9081	.3672	8.0000	0.0000	8.0000
3	6.2222	2.9526	.5682	11.0000	1.0000	10.0000
4	6.1111	3.5554	.6842	13.0000	0.0000	13.0000
5	4.2963	3.0359	.5843	11.0000	0.0000	11.0000
6	3.0370	2.5189	.4848	8.0000	0.0000	8.0000
7	1.2593	1.6075	.3094	5.0000	0.0000	5.0000
8	1.9630	2.3284	.4481	8.0000	0.0000	8.0000
9	8.1852	5.5125	1.0609	22.0000	1.0000	21.0000
10	7.6667	10.2319	1.9691	34.0000	0.0000	34.0000
11	11.6667	9.1315	1.7574	31.0000	0.0000	31.0000
12	19.5185	10.4564	2.0123	38.0000	2.0000	36.0000
13	1.1667	1.5993	.3078	7.0000	0.0000	7.0000
14	5.8519	6.6025	1.2706	25.0000	0.0000	25.0000
15	9.3333	3.8155	.7343	15.0000	2.0000	13.0000
16	2.1667	1.9807	.3812	5.0000	0.0000	5.0000
17	10.6296	8.2422	1.5862	29.0000	3.0000	26.0000
18	3.4444	5.5424	1.0666	24.0000	0.0000	24.0000
19	6.1852	1.2721	.2448	7.0000	3.0000	4.0000
20	9.8148	6.8615	1.3205	25.0000	5.0000	20.0000
21	29.6667	12.4900	2.4037	65.0000	13.0000	52.0000
22	82.2222	128.9105	24.8089	500.0000	0.0000	500.0000
23	1.3444	1.0017	.1928	5.0000	0.0000	5.0000
24	1.5148	.7853	.1511	3.5000	.5000	3.0000
25	1.3630	.7191	.1384	3.0000	.5000	2.5000
26	1.6185	.7519	.1447	3.0000	.6000	2.4000
27	.9259	1.9792	.3809	5.0000	0.0000	5.0000
28	.9259	1.9792	.3809	5.0000	0.0000	5.0000
29	9.0741	3.1123	.5990	15.0000	5.0000	10.0000
30	2.9630	2.5036	.4818	5.0000	0.0000	5.0000
31	8.1481	2.4605	.4735	10.0000	5.0000	5.0000
32	9.4444	1.6013	.3082	10.0000	5.0000	5.0000
33	31.4815	5.1543	.9919	40.0000	20.0000	20.0000
34	31.9259	16.8430	3.2414	66.0000	6.0000	60.0000
35	5.2963	2.5048	.4821	8.0000	1.5000	6.5000
36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	5.2963	2.5048	.4821	8.0000	1.5000	6.5000
38	2.5741	.7684	.1479	4.0000	1.5000	2.5000
39	1.1111	.2805	.0540	1.5000	.5000	1.0000
40	1904.[illegible]	932.4877	179.4573	4250.0000	0.0000	4250.0000
41	.5556	.3367	.0648	1.5000	0.0000	1.5000
42	128.5926	187.8142	36.1449	900.0000	0.0000	900.0000
43	.2963	.2696	.0519	1.0000	0.0000	1.0000
44	128.3733	242.9744	46.7604	1125.0000	0.0000	1125.0000
45	.4037	.3368	.0648	1.3000	0.0000	1.3000
46	157.0370	189.5098	36.4712	640.0000	0.0000	640.0000
47	1821.1111	1010.4285	194.4571	5030.0000	325.0000	4705.0000
48	8.1481	25.7259	4.9510	100.0000	[illegible]	100.0000
49	1787.4[illegible]	1055.2221	203.2[illegible]	5030.0000	260.0000	4770.0000
50	.0741	.3849	.0741	2.0000	0.0000	2.0000
51	.1481	.3620	.0697	1.0000	0.0000	1.0000
52	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	.0741	.3849	.0741	2.0000	0.0000	2.0000
54	.1111	.3203	.0616	1.0000	0.0000	1.0000
55	11.3704	10.8101	2.0804	40.0000	0.0000	40.0000
56	46.7407	113.5811	21.8587	590.0000	0.0000	590.0000
57	.5185	1.3118	.2525	5.0000	0.0000	5.0000
58	.3704	.5649	.1087	2.0000	0.0000	2.0000
59	1.1111	1.1209	.2157	4.0000	0.0000	4.0000
60	1.6852	.8868	.1707	4.0000	.5000	3.5000
61	31.6667	64.3159	12.3776	300.0000	0.0000	300.0000
62	111.6667	221.0073	42.5329	1000.0000	0.0000	1000.0000
63	970.7407	524.0884	100.8609	2000.0000	100.0000	1910.0000
64	1292.9630	527.2995	101.4788	2700.0000	200.0000	2500.0000
65	[illegible]	28.6465	5.5130	111.1100	0.1000	111.1[illegible]
66	289.9815	207.2174	39.8790	944.4350	0.0000	944.43[illegible]
67	23.9758	41.7361	8.0321	199.9980	0.0000	199.9980
68	29.5132	53.9928	10.3911	249.9975	0.0000	249.9975
69	34.8968	42.1129	8.1046	142.2208	0.0000	142.2208
70	434.6873	224.5374	43.2122	1117.7665	72.2215	1045.5451
71	1.8137	5.7168	1.1002	22.2220	0.0000	22.2220
72	397.1933	234.7137	45.1707	1117.7666	57.7772	1059.[illegible]94
73	13.3707	25.2400	4.9574	131.1098	0.0000	131.1098
74	24.8144	49.1122	9.4517	222.2200	0.0000	222.2200
75	[illegible]	116.4629	22.4133	444.4400	22.2220	422.[illegible]
76	247.[illegible]	117.1765	22.5505	599.9940	44.4440	5[illegible]

VARIABLE CODE AND DESCRIPTION

NON-QUANTITATIVE VARIABLES

Var. No.	Code	Description	Q.No.*
1		PLACE OF BIRTH	2
	1	Same Municipio	
	2	Other Municipio of the same State	
	3	Other Northeast State	
	4	Other State of Brazil	
	5	Other Country	
2		MARITAL STATUS	4
	1	Single	
	2	Married	
	3	Widowed	
	4	Other	
3		LITERACY	5
	1	Literate	
	2	Illiterate	
4		OCCUPATIONAL ASPIRATIONS FOR SONS	11
	1	Work in Agriculture	
	2	Work in Industry or Other Non-Agric. Work	
	3	Professional Work (eg. Clerk, Administrator etc)	
	4	"Don't Know"	
5		OCCUPATIONAL ASPIRATIONS FOR DAUGHTERS	11
	1	Domestic Work, Housewife	
	2	Other Types of Work (eg.teaching, sewing, etc.)	
	3	Professional Work (requiring higher education)	
	4	"Don't Know"	
6		RESIDENCE PRIOR TO SETTLEMENT	14
	1	Zona da Mata	
	2	Agreste	
	3	Sertão	
	4	Other Northeast Region	
	5	Other Part of Brazil	
	6	Other Country	
7		TYPE OF WORK PRIOR TO SETTLEMENT	15
	1	Worked for himself in Agriculture	
	2	Worked for others in Agriculture	
	3	Other Type of Work	
8		DID WIFE AND/OR CHILDREN WORK PRIOR TO SETTLEMT?	19
	1	Yes	
	2	No	

*Number of Question in the Interview Schedule

NON-QUANTITATIVE VARIABLES (contd.)

Var. No.	Code	Description	Q.No
9		WAS IT EASIER TO FEED AND CLOTH YOUR FAMILY PRIOR TO SETTLEMENT?	20
	1	Was easier than now	
	2	Was more difficult than now	
	3	No difference	
10		WERE EDUCATIONAL OPPORTUNITIES FOR YOUR CHILDREN BETTER PRIOR TO SETTLEMENT?	21
	1	Were better	
	2	Are better now	
	3	No difference	
11		WERE MEDICAL SERVICES YOU RECEIVED BETTER PRIOR TO SETTLEMENT?	22
	1	Were better	
	2	Are better now	
	3	No difference	
12		ACCOMODATIONS PRIOR TO SETTLEMENT	23
	1	Rented a house	
	2	Owned a house	
	3	Lived in house provided by the landlord	
13		QUALITY OF HOUSING PRIOR TO SETTLEMENT	23
	1	Was better	
	2	Is better now	
	3	No difference	
14		DID YOU HAVE A PARCEL OF LAND BEFORE BECOMING A SETTLER?	25
	1	Yes	
	2	No	
15		CONDITION OF TENURE OF SUCH LAND?	25
	1	Had title	
	2	Did not have title (squatter)	
	3	Rented land	
	4	Worked a subsistence parcel provided by patrão	
16		PRIOR TO SETTLEMENT DID YOU USE OR HAVE EXPERIENCE IN THE USE OF ORGANIC FERTILIZER?	28
	1	Yes	
	2	No	

NON-QUANTITATIVE VARIABLES (contd.)

Var.No.	Code	Description	Q.No.
17		PRIOR TO SETTLEMENT USED OR HAD EXPERIENCE IN THE USE OF CHEMICAL FERTILIZER	28
	1	Yes	
	2	No	
18		USED ANIMALS TO WORK THE LAND	28
	1	Yes	
	2	No	
19		HAD EXPERIENCE WITH TRACTORS, MACHINES	28
	1	Yes	
	2	No	
20		WAS A MEMBER OF A COOPERATIVE	29
	1	Yes	
	2	No	
21		HAD EXPERIENCE SELLING AGRICULTURAL PRODUCTS	30
	1	Yes	
	2	No	
22		COMMENCED PAYMENTS ON HIS PROPERTY	33
	1	Yes	
	2	No	
	3	Debt paid off in full	
23		CONSTRUCTION OF SETTLER's HOME	39
	1	Built by settler without assistance	
	2	Built by settler with assistance from agency	
	3	House was ready at the time of settlement	
24		REASONS FOR LIMITED LAND AREA IN PRODUCTION	43
	1	Entire area under cultivation (Q.not relevant)	
	2	Lack of Capital	
	3	Inability to secure outside labour	
	4	Reasons of Health, Old Age, etc.	
	5	Other reasons (eg. forest clearing prohibited)	
25		CROP ONE (NUMBER OF SETTLERS REPORTING AS THEIR MOST IMPORTANT CROP)	44
	1	Banana	
	3	Citrus	
	8	Coconut	
	9	Guava	
	10	Passion Fruit	
	11	Manioc	
	15	Corn	
	16	Beans	
	17	Sugar Cane	
	18	Tobaco	
	25	Vegetable	

NON-QUANTITATIVE VARIABLES (contd.)

Var. No.	Code	Description			Q.No.
26		CROP TWO (SECOND MOST IMPORTANT CASH CROP)			44
	0	No second crop	14	Yams	
	1	Banana	15	Corn	
	3	Citrus	16	Beans	
	4	Pineapple	17	Sugar Cane	
	8	Coconut	20	Rice	
	9	Guava	21	Peanuts	
	10	Passion Fruit	24	Papaya	
	11	Manioc	25	Vegetable	
	13	Sweet Potatoes			
27		CROP THREE (THIRD MOST IMPORTANT CASH CROP)			44
	0	No third crop	13	Sweet Potatoes	
	1	Banana	14	Yams	
	2	Mango	15	Corn	
	3	Citrus	16	Beans	
	4	Pineapple	17	Sugar Cane	
	8	Coconut	18	Tobaco	
	9	Guava	20	Rice	
	10	Passion Fruit	25	Vegetable	
	11	Manioc			
28		ALWAYS PLANTS THE SAME CROPS			45
	1	Yes			
	2	No			
29		BURNS LAND PRIOR TO PLANTING			46
	1	Yes			
	2	No			
30		USES IRRIGATION			47
	1	Yes			
	2	No			
31		USES CHEMICAL FERTILIZER			48
	1	Yes			
	2	No			
32		REASONS FOR NON-USE OF CHEM. FERTILIZER			48
	1	Not available			
	2	Too expensive (or "can't afford it")			
	3	"Don't know about it"			
	4	Other reasons (eg. lack of information etc.)			

NON-QUANTITATIVE VARIABLES (contd.)

Var.No.	Code	Description	Q.No.
33		USES INSECTICIDES AND FUNGICIDES	49
	1	Yes	
	2	No	
34		REASONS FOR NON-USE OF INSECTIC.,FUNGICIDES	49
	1	Not available	
	2	Too expensive (or can't afford it)	
	3	"Don't know about it"	
	4	Other reasons (eg. lack of guidance or information)	
35		PRACTICES CROP ROTATION	50
	1	Yes	
	2	No	
36		PREDOMINANT MARKETING CHANNEL	51
	1	Cooperative	
	2	Local Market	
	3	Intermediary (Middle Men)	
	4	Sugar Mill	
	5	Recife Wholesale Market (CARE)	
37		ANY PROBLEM IN SELLING FARM PRODUCT	52
	1	Yes	
	2	No	
38		WHICH DO YOU PREFER TO DEAL WITH PLANT AND ANIMAL DISEASES - FAITH AND PRAYER OR CHEMICALS?	55
	1	Prayer	
	2	Agricultural Chemicals	
	3	Depends on the type of problem	
	4	"Don't know"	
39		ARE AGRONOMISTS KNOWLEDGEABLE TO ASSIST YOU?	56
	1	Yes	
	2	No	
	3	"Don't know"	
40		DO YOU USE ANIMALS TO WORK THE LAND?	58
	1	Yes	
	2	No	
41		HAVE YOU EVER USED CREDIT SINCE BECOMING A SETTLER IN THIS COLONY?	62
	1	Yes	
	2	No	

NON-QUANTITATIVE VARIABLES (contd.)

Var.No.	Code	Description	Q.No.
42		IS IT POSSIBLE TO OBTAIN CREDIT?	62
	1	Yes	
	2	No	
43		CREDIT SOURCE	62
	1	Through the agency and the bank	
	2	Through the cooperative	
	3	From Middle Men	
44		ARE YOU A MEMBER OF A COOPERATIVE?	63
	1	Yes	
	2	No	
45		ARE YOU SATISFIED WITH THE ASSISTANCE RECEIVED FROM THE ADMINISTRATION?	64
	1	Yes	
	2	No	
46		ARE YOU SATISFIED WITH YOUR LIFE IN AGRICULT.?	66
	1	Yes	
	2	No	
47		DO YOU WISH TO LEAVE AGRICULTURE?	66
	1	Yes	
	2	No	
48		SUBJECTIVE RATING OF INTERVIEWER ABOUT THE SETTLERS KNOWLEDGE AND ABILITY AS A FARMER	A2
	1	Very good	
	2	Good	
	3	Fair	
	4	Poor	
	5	Very Poor	
49		SUBJ.RATING: RELATIONSHIP BETWEEN THE SETTLER AND THE ADMINISTRATION	A3
	1	Good	
	2	Fair	
	3	Poor	
50		SUBJ. RATING: SOCIAL INVOLVEMENT OF SETTLER	A4
	1	Much involvement	
	2	Some involvement	
	3	No involvement	

NON-QUANTITATIVE VARIABLES (contd.)

Var.No.	Code	Description	Q.No.
51		PHYSIOGRAPHY OF SETTLER'S PARCEL	A7
	1	Level or nearly level land	
	2	Moderate slope, up to 20%	
	3	Slope 20% to 40%	
	4	Slope in excess of 40% or very poor drainage	
		(Physiographic classification was applied to the area in each case that is normally under cultivation)	

SEVEN COLONIES N = 152

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	55	36.42
2	77	50.99
3	16	10.60
5	3	1.99
TOTAL	151	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
1	5	3.29
2	133	87.50
3	3	1.97
4	11	7.24
TOTAL	152	

V3 LITERACY

CODE	FREQ.	PERCENT
1	51	33.55
2	101	66.45
TOTAL	152	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
1	7	5.43
2	27	20.93
3	59	45.74
4	36	27.91
TOTAL	129	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
1	12	12.12
2	60	60.61
3	10	10.10
4	17	17.17
TOTAL	99	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	78	51.32
2	57	37.50
3	9	5.92
4	1	.66
5	5	3.29
6	2	1.32
TOTAL	152	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	55	37.93
2	62	42.76
3	28	19.31
TOTAL	145	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	77	60.16
2	51	39.84
TOTAL	128	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
1	33	25.00
2	68	51.52
3	31	23.48
TOTAL	132	

V10 EDUCATION

CODE	FREQ.	PERCENT
1	11	9.48
2	84	72.41
3	20	17.24
4	1	.86
TOTAL	116	

V11 MEDIC.FACILT.

CODE	FREQ.	PERCENT
1	25	19.69
2	77	60.63
3	25	19.69
TOTAL	127	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
1	24	15.79
2	45	29.61
3	83	54.61
TOTAL	152	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	23	15.13
2	111	73.03
3	18	11.84
TOTAL	152	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	105	69.08
2	47	30.92
TOTAL	152	

V15 TENURE

CODE	FREQ.	PERCENT
1	25	23.81
2	6	5.71
3	10	9.52
4	64	60.95
TOTAL	105	

V16 U. OPG. FERT.

CODE	FREQ.	PERCENT
1	26	17.11
2	126	82.89
TOTAL	152	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	14	9.21
2	138	90.79
TOTAL	152	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	9	5.92
2	143	94.08
TOTAL	152	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
1	6	3.95
2	146	96.05
TOTAL	152	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	30	19.74
2	122	80.26
TOTAL	152	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	117	76.97
2	35	23.03
TOTAL	152	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
1	42	27.63
2	93	61.18
3	17	11.18
TOTAL	152	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
1	27	17.76
2	51	33.55
3	74	48.68
TOTAL	152	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
1	5	3.29
2	87	57.24
3	7	4.61
4	7	4.61
5	46	30.26
TOTAL	152	

V25 CROP ONE

CODE	FREQ.	PERCENT
1	2	1.32
3	1	.66
8	9	5.92
9	1	.66
10	33	21.71
11	15	9.87
15	1	.66
16	1	.66
17	63	41.45
18	25	16.45
25	1	.66
TOTAL	152	

V26 CROP TWO

CODE	FREQ.	PERCENT
0	4	2.63
1	28	18.42
3	6	3.95
4	3	1.97
8	15	9.87
9	1	.66
10	8	5.26
11	59	38.82
13	1	.66
14	2	1.32
15	2	1.32
16	1	.66
17	5	3.29
20	4	2.63
21	2	1.32
24	1	.66
25	1	.66
TOTAL	152	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	20	13.16
1	34	22.37
2	1	.66
3	12	7.89
4	4	2.63
8	4	2.63
9	1	.66
10	3	1.97
11	32	21.05
13	1	.66
14	3	1.97
15	2	1.32
16	1	.66
17	4	2.63
20	1	.66
25	2	1.32
TOTAL	152	

V28 ALN. SAME CROP

CODE	FREQ.	PERCENT
1	[illegible]	[illegible]
2	[illegible]	[illegible]

SUMMARY STATISTICS - NON-QUANTITATIVE VARIABLES

SEVEN COLONIES N = 152

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	122	80.26
2	30	19.74
TOTAL	152	

V30 USES IRRIG.

CODE	FREQ.	PERCENT
1	9	5.92
2	143	94.08
TOTAL	152	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	74	49.01
2	77	50.99
TOTAL	151	

V32 WHY NOT

CODE	FREQ.	PERCENT
1	9	11.54
2	38	48.72
3	4	5.13
4	27	34.62
TOTAL	78	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	112	73.68
2	40	26.32
TOTAL	152	

V34 WHY NOT

CODE	FREQ.	PERCENT
2	18	43.90
3	12	29.27
4	11	26.83
TOTAL	41	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	87	57.24
2	65	42.76
TOTAL	152	

V36 MARKETS

CODE	FREQ.	PERCENT
1	68	44.74
2	23	15.13
3	8	5.26
4	51	33.55
5	2	1.32
TOTAL	152	

V37 PROP. SELLING

CODE	FREQ.	PERCENT
1	9	5.92
2	143	94.08
TOTAL	152	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
1	5	3.29
2	123	80.92
3	10	6.58
4	14	9.21
TOTAL	152	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	131	86.18
2	6	3.95
3	15	9.87
TOTAL	152	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	6	3.95
2	146	96.05
TOTAL	152	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	137	90.73
2	14	9.27
TOTAL	151	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	127	83.55
2	25	16.45
TOTAL	152	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
1	57	41.61
2	79	57.66
3	1	.73
TOTAL	137	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	114	75.00
2	38	25.00
TOTAL	152	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	104	68.42
2	48	31.58
TOTAL	152	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	146	96.05
2	6	3.95
TOTAL	152	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
1	9	5.92
2	143	94.08
TOTAL	152	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	73	48.03
2	53	34.87
3	18	11.84
4	7	4.61
5	1	.66
TOTAL	152	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	65	42.76
2	73	48.03
3	14	9.21
TOTAL	152	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
1	15	9.87
2	52	34.21
3	85	55.92
TOTAL	152	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
1	32	21.05
2	62	40.79
3	49	32.24
4	9	5.92
TOTAL	152	

CAMARATUBA N = 9

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	1	11.11
2	6	66.67
3	2	22.22
TOTAL	9	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V3 LITERACY

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
1	1	16.67
2	2	33.33
3	3	50.00
TOTAL	6	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
1	1	16.67
2	5	83.33
TOTAL	6	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	4	44.44
2	4	44.44
4	1	11.11
TOTAL	9	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	5	62.50
2	3	37.50
TOTAL	8	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	5	71.43
2	2	28.57
TOTAL	7	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
3	3	42.86
4	4	57.14
TOTAL	7	

V10 EDUCATION

CODE	FREQ.	PERCENT
2	5	62.50
3	2	25.00
4	1	12.50
TOTAL	8	

V11 MEDIC.FACILT.

CODE	FREQ.	PERCENT
3	3	42.86
4	4	57.14
TOTAL	7	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
2	3	33.33
3	4	44.44
TOTAL	9	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	2	22.22
2	7	77.78
TOTAL	9	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	7	77.78
2	2	22.22
TOTAL	9	

V15 TENURE

CODE	FREQ.	PERCENT
1	2	28.57
3	2	28.57
4	3	42.86
TOTAL	7	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	1	11.11
2	8	88.89
TOTAL	9	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	7	77.78
2	2	22.22
TOTAL	9	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
3	9	100.00
TOTAL	9	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
2	5	55.56
3	1	11.11
4	1	11.11
5	2	22.22
TOTAL	9	

V25 CROP ONE

CODE	FREQ.	PERCENT
11	8	88.89
16	1	11.11
TOTAL	9	

V26 CROP TWO

CODE	FREQ.	PERCENT
4	1	11.11
8	2	22.22
14	2	22.22
15	1	11.11
16	3	33.33
TOTAL	9	

V27 CROP THREE

CODE	FREQ.	PERCENT
3	1	11.11
8	3	33.33
15	2	22.22
16	1	11.11
17	1	11.11
25	1	11.11
TOTAL	9	

V28 ALW. SAME CROP

CODE	FREQ.	PERCENT
1	8	100.00
TOTAL	8	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	9	100.00
TOTAL	9	

V30 USES IRRIG.

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V32 WHY NOT

CODE	FREQ.	PERCENT
2	4	44.44
3	2	22.22
4	3	33.33
TOTAL	9	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	7	77.78
2	2	22.22
TOTAL	9	

V34 WHY NOT

CODE	FREQ.	PERCENT
3	2	100.00
TOTAL	2	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	4	44.44
2	5	55.56
TOTAL	9	

V36 MARKETS

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V37 PROD. SELLING

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
1	1	11.11
2	7	77.78
3	1	11.11
TOTAL	9	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	8	88.89
3	1	11.11
TOTAL	9	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	4	44.44
2	5	55.56
TOTAL	9	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	3	33.33
2	6	66.67
TOTAL	9	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
1	3	75.00
3	1	25.00
TOTAL	4	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	6	66.67
2	3	33.33
TOTAL	9	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	9	100.00
TOTAL	9	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	9	100.00
TOTAL	9	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
2	9	100.00
TOTAL	9	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	3	33.33
2	3	33.33
3	2	22.22
4	1	11.11
TOTAL	9	

V49 REL. SOL/ADMIN.

CODE	FREQ.	PERCENT
1	4	44.44
2	4	44.44
3	1	11.11
TOTAL	9	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
2	2	22.22
3	7	77.78
TOTAL	9	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
1	1	11.11
2	8	88.89
TOTAL	9	

CRC CABO N = 32

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	10	31.25
2	18	56.25
3	3	9.38
5	1	3.13
TOTAL	32	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
2	28	87.50
4	4	12.50
TOTAL	32	

V3 LITERACY

CODE	FREQ.	PERCENT
1	12	37.50
2	20	62.50
TOTAL	32	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
1	3	11.54
2	6	23.08
3	12	46.15
4	5	19.23
TOTAL	26	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
1	4	14.81
2	12	44.44
3	4	14.81
4	7	25.93
TOTAL	27	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	28	87.50
2	4	12.50
TOTAL	32	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	6	20.69
2	14	48.28
3	9	31.03
TOTAL	29	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	16	51.61
2	15	48.39
TOTAL	31	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
1	8	25.81
2	17	54.84
3	6	19.35
TOTAL	31	

V10 EDUCATION

CODE	FREQ.	PERCENT
1	4	14.29
2	19	67.86
3	5	17.86
TOTAL	28	

V11 MEDIC.FACILI.

CODE	FREQ.	PERCENT
1	7	24.14
2	14	48.28
3	8	27.59
TOTAL	29	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
1	1	3.13
2	8	25.00
3	23	71.88
TOTAL	32	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	6	18.75
2	23	71.88
3	3	9.38
TOTAL	32	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	24	75.00
2	8	25.00
TOTAL	32	

V15 TENURE

CODE	FREQ.	PERCENT
1	4	16.67
2	1	4.17
4	19	79.17
TOTAL	24	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
1	3	9.38
2	29	90.63
TOTAL	32	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	4	12.50
2	28	87.50
TOTAL	32	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	1	3.13
2	31	96.88
TOTAL	32	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
2	32	100.00
TOTAL	32	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	11	34.38
2	21	65.63
TOTAL	32	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	22	68.75
2	10	31.25
TOTAL	32	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
1	27	84.38
2	5	15.63
TOTAL	32	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
1	1	3.13
2	16	50.00
3	15	46.88
TOTAL	32	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
1	2	6.25
2	19	59.38
4	3	9.38
5	8	25.00
TOTAL	32	

V25 CROP ONE

CODE	FREQ.	PERCENT
1	2	6.25
10	1	3.13
17	29	90.63
TOTAL	32	

V26 CROP TWO

CODE	FREQ.	PERCENT
0	2	6.25
1	15	46.88
3	1	3.13
11	11	34.38
15	1	3.13
17	2	6.25
TOTAL	32	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	2	6.25
1	11	34.38
3	2	6.25
4	1	3.13
11	14	43.75
14	1	3.13
25	1	3.13
TOTAL	32	

V28 ALH. SAME CROP

CODE	FREQ.	PERCENT
1	32	100.00
TOTAL	32	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	29	90.63
2	3	9.38
TOTAL	32	

V30 USES IPPIG.

CODE	FREQ.	PERCENT
1	1	3.13
2	31	96.88
TOTAL	32	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	4	12.50
2	28	87.50
TOTAL	32	

V32 WHY NOT

CODE	FREQ.	PERCENT
1	7	25.93
2	14	51.85
3	1	3.70
4	5	18.52
TOTAL	27	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	14	43.75
2	18	56.25
TOTAL	32	

V34 WHY NOT

CODE	FREQ.	PERCENT
2	7	38.89
3	5	27.78
4	6	33.33
TOTAL	18	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	20	62.50
2	12	37.50
TOTAL	32	

V36 MARKETS

CODE	FREQ.	PERCENT
2	5	15.63
3	3	9.38
4	24	75.00
TOTAL	32	

V37 PROB. SELLING

CODE	FREQ.	PERCENT
1	7	21.88
2	25	78.13
TOTAL	32	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
2	29	90.63
3	1	3.13
4	2	6.25
TOTAL	32	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	25	78.13
2	3	9.38
3	4	12.50
TOTAL	32	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	32	100.00
TOTAL	32	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	30	93.75
2	2	6.25
TOTAL	32	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	30	93.75
2	2	6.25
TOTAL	32	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
1	30	100.00
TOTAL	30	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	4	12.50
2	28	87.50
TOTAL	32	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	19	59.38
2	13	40.63
TOTAL	32	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	31	96.88
2	1	3.13
TOTAL	32	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
1	5	15.63
2	27	84.38
TOTAL	32	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	12	37.50
2	16	50.00
3	2	6.25
4	2	6.25
TOTAL	32	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	14	43.75
2	17	53.13
3	1	3.13
TOTAL	32	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
1	1	3.13
2	2	6.25
3	29	90.63
TOTAL	32	

V51 PHYSICG.

CODE	FREQ.	PERCENT
2	5	15.63
3	22	68.75
4	5	15.63
TOTAL	32	

SUMMARY STATISTICS - NON-QUANTITATIVE VARIABLES

CRC VITORIA N = 6

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	3	60.00
2	2	40.00
TOTAL	5	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
1	1	16.67
2	5	83.33
TOTAL	6	

V3 LITERACY

CODE	FREQ.	PERCENT
1	4	66.67
2	2	33.33
TOTAL	6	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
2	1	20.00
3	4	80.00
TOTAL	5	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
2	5	100.00
TOTAL	5	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	6	100.00
TOTAL	6	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	2	33.33
2	3	50.00
3	1	16.67
TOTAL	6	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	3	60.00
2	2	40.00
TOTAL	5	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
2	5	100.00
TOTAL	5	

V10 EDUCATION

CODE	FREQ.	PERCENT
2	4	100.00
TOTAL	4	

V11 MEDIC.FACILT.

CODE	FREQ.	PERCENT
2	5	83.33
3	1	16.67
TOTAL	6	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
1	2	33.33
3	4	66.67
TOTAL	6	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V15 TENURE

CODE	FREQ.	PERCENT
2	1	20.00
3	1	20.00
4	3	60.00
TOTAL	5	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	1	16.67
2	5	83.33
TOTAL	6	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
1	1	16.67
2	5	83.33
TOTAL	6	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
1	6	100.00
TOTAL	6	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
3	6	100.00
TOTAL	6	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
1	1	16.67
2	3	50.00
5	2	33.33
TOTAL	6	

V25 CROP ONE

CODE	FREQ.	PERCENT
11	2	33.33
17	4	66.67
TOTAL	6	

V26 CROP TWO

CODE	FREQ.	PERCENT
1	1	16.67
11	3	50.00
17	1	16.67
24	1	16.67
TOTAL	6	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	1	16.67
1	3	50.00
3	1	16.67
25	1	16.67
TOTAL	6	

V28 ALW. SAME CROP

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	3	50.00
2	3	50.00
TOTAL	6	

V30 USES IRRIG.

CODE	FREQ.	PERCENT
1	4	66.67
2	2	33.33
TOTAL	6	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
2	5	100.00
TOTAL	5	

V32 WHY NOT

CODE	FREQ.	PERCENT
1	1	20.00
2	2	40.00
3	1	20.00
4	1	20.00
TOTAL	5	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V34 WHY NOT

CODE	FREQ.	PERCENT
2	1	100.00
TOTAL	1	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	2	33.33
2	4	66.67
TOTAL	6	

V36 MARKETS

CODE	FREQ.	PERCENT
2	5	83.33
3	1	16.67
TOTAL	6	

V37 PROB. SELLING

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	6	100.00
TOTAL	6	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
1	5	100.00
TOTAL	5	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	6	100.00
TOTAL	6	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	6	100.00
TOTAL	6	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
2	6	100.00
TOTAL	6	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	4	66.67
2	1	16.67
4	1	16.67
TOTAL	6	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	4	66.67
2	2	33.33
TOTAL	6	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
1	2	33.33
2	3	50.00
3	1	16.67
TOTAL	6	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
2	1	16.67
3	4	66.67
4	1	16.67
TOTAL	6	

TIRIRI N = 29

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	11	37.93
2	18	62.07
TOTAL	29	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
1	2	6.90
2	23	79.31
4	4	13.79
TOTAL	29	

V3 LITERACY

CODE	FREQ.	PERCENT
1	6	20.69
2	23	79.31
TOTAL	29	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
2	5	20.00
3	13	52.00
4	7	28.00
TOTAL	25	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
1	2	12.50
2	10	62.50
3	4	25.00
TOTAL	16	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	27	93.10
2	2	6.90
TOTAL	29	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	3	10.71
2	21	75.00
3	4	14.29
TOTAL	28	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	19	70.37
2	8	29.63
TOTAL	27	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
1	5	18.52
2	17	62.96
3	5	18.52
TOTAL	27	

V10 EDUCATION

CODE	FREQ.	PERCENT
1	2	8.70
2	17	73.91
3	4	17.39
TOTAL	23	

V11 MEDIC.FACILI.

CODE	FREQ.	PERCENT
1	11	42.31
2	14	53.85
3	1	3.85
TOTAL	26	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
1	1	3.45
2	2	6.90
3	26	89.66
TOTAL	29	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	2	6.90
2	22	75.86
3	5	17.24
TOTAL	29	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	24	82.76
2	5	17.24
TOTAL	29	

V15 TENURE

CODE	FREQ.	PERCENT
3	2	8.33
4	22	91.67
TOTAL	24	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
1	1	3.45
2	28	96.55
TOTAL	29	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	3	10.34
2	26	89.66
TOTAL	29	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	1	3.45
2	28	96.55
TOTAL	29	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
1	1	3.45
2	28	96.55
TOTAL	29	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	12	41.38
2	17	58.62
TOTAL	29	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	24	82.76
2	5	17.24
TOTAL	29	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
2	29	100.00
TOTAL	29	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
1	8	27.59
2	5	17.24
3	16	55.17
TOTAL	29	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
1	1	3.45
2	18	62.07
4	1	3.45
5	9	31.03
TOTAL	29	

V25 CROP ONE

CODE	FREQ.	PERCENT
17	29	100.00
TOTAL	29	

V26 CROP TWO

CODE	FREQ.	PERCENT
1	7	24.14
11	22	75.86
TOTAL	29	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	7	24.14
1	14	48.28
2	1	3.45
3	1	3.45
11	4	13.79
15	2	6.90
TOTAL	29	

V28 ALW. SAME CROP

CODE	FREQ.	PERCENT
1	27	93.10
2	2	6.90
TOTAL	29	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	24	82.76
2	5	17.24
TOTAL	29	

V30 USES IRRIG.

CODE	FREQ.	PERCENT
2	29	100.00
TOTAL	29	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	7	24.14
2	22	75.86
TOTAL	29	

V32 WHY NOT

CODE	FREQ.	PERCENT
1	1	4.35
2	16	69.57
4	6	26.09
TOTAL	23	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	11	37.93
2	18	62.07
TOTAL	29	

V34 WHY NOT

CODE	FREQ.	PERCENT
2	10	52.63
3	5	26.32
4	4	21.05
TOTAL	19	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	13	44.83
2	16	55.17
TOTAL	29	

V36 MARKETS

CODE	FREQ.	PERCENT
2	1	3.45
3	1	3.45
4	27	93.10
TOTAL	29	

V37 PROP. SELLING

CODE	FREQ.	PERCENT
2	29	100.00
TOTAL	29	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
1	2	6.90
2	22	75.86
3	1	3.45
4	4	13.79
TOTAL	29	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	26	89.66
2	1	3.45
3	2	6.90
TOTAL	29	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	3	10.34
2	26	89.66
TOTAL	29	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	26	89.66
2	3	10.34
TOTAL	29	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	23	79.31
2	6	20.69
TOTAL	29	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
1	2	7.69
2	24	92.31
TOTAL	26	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	29	100.00
TOTAL	29	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	17	58.62
2	12	41.38
TOTAL	29	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	27	93.10
2	2	6.90
TOTAL	29	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
1	1	3.45
2	28	96.55
TOTAL	29	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	5	17.24
2	15	51.72
3	6	20.69
4	2	6.90
5	1	3.45
TOTAL	29	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	7	24.14
2	21	72.41
3	1	3.45
TOTAL	29	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
3	29	100.00
TOTAL	29	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
1	1	3.45
2	12	41.38
3	13	44.83
4	3	10.34
TOTAL	29	

SUMMARY STATISTICS - NON-QUANTITATIVE VARIABLES

RIO BONITO N = 7

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	3	42.86
2	2	28.57
5	2	28.57
TOTAL	7	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
2	7	100.00
TOTAL	7	

V3 LITERACY

CODE	FREQ.	PERCENT
1	6	85.71
2	1	14.29
TOTAL	7	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
1	1	14.29
2	2	28.57
3	4	57.14
TOTAL	7	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
2	3	75.00
4	1	25.00
TOTAL	4	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	1	14.29
2	4	57.14
6	2	28.57
TOTAL	7	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	5	71.43
3	2	28.57
TOTAL	7	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	5	83.33
2	1	16.67
TOTAL	6	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
1	1	16.67
2	4	66.67
3	1	16.67
TOTAL	6	

V10 EDUCATION

CODE	FREQ.	PERCENT
1	1	20.00
2	2	40.00
3	2	40.00
TOTAL	5	

V11 MEDIC.FACILT.

CODE	FREQ.	PERCENT
2	4	80.00
3	1	20.00
TOTAL	5	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
2	4	57.14
3	3	42.86
TOTAL	7	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	2	28.57
2	3	42.86
3	2	28.57
TOTAL	7	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	4	57.14
2	3	42.86
TOTAL	7	

V15 TENURE

CODE	FREQ.	PERCENT
1	2	50.00
4	2	50.00
TOTAL	4	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
1	3	42.86
2	4	57.14
TOTAL	7	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	3	42.86
2	4	57.14
TOTAL	7	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	2	28.57
2	5	71.43
TOTAL	7	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
1	2	28.57
2	5	71.43
TOTAL	7	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	2	28.57
2	5	71.43
TOTAL	7	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	6	85.71
2	1	14.29
TOTAL	7	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
2	7	100.00
TOTAL	7	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
1	2	28.57
3	5	71.43
TOTAL	7	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
2	6	85.71
5	1	14.29
TOTAL	7	

V25 CROP ONE

CODE	FREQ.	PERCENT
9	1	14.29
10	2	28.57
11	3	42.86
25	1	14.29
TOTAL	7	

V26 CROP TWO

CODE	FREQ.	PERCENT
1	2	28.57
10	2	28.57
11	1	14.29
13	1	14.29
25	1	14.29
TOTAL	7	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	1	14.29
1	1	14.29
3	1	14.29
9	1	14.29
10	1	14.29
15	1	14.29
17	1	14.29
TOTAL	7	

V28 ALW. SAME CROP

CODE	FREQ.	PERCENT
1	5	71.43
2	2	28.57
TOTAL	7	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	4	57.14
2	3	42.86
TOTAL	7	

V30 USES IRRIG.

CODE	FREQ.	PERCENT
1	4	57.14
2	3	42.86
TOTAL	7	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	6	85.71
2	1	14.29
TOTAL	7	

V32 WHY NOT

CODE	FREQ.	PERCENT
2	1	100.00
TOTAL	1	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	7	100.00
TOTAL	7	

V34 WHY NOT

CODE	FREQ.	PERCENT
TOTAL	0	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	5	71.43
2	2	28.57
TOTAL	7	

TABLE A 14 (contd.)

RIO BONITO

V36 MARKETS

CODE	FREQ.	PERCENT
1	1	14.29
2	1	14.29
3	3	42.86
5	2	28.57
TOTAL	7	

V37 PROB. SELLING

CODE	FREQ.	PERCENT
2	7	100.00
TOTAL	7	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
2	7	100.00
TOTAL	7	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	6	85.71
3	1	14.29
TOTAL	7	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	7	100.00
TOTAL	7	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	5	71.43
2	2	28.57
TOTAL	7	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	5	71.43
2	2	28.57
TOTAL	7	

V43 CREDIT [illegible]

CODE	FREQ.	PERCENT
1	5	100.00
TOTAL	5	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	3	42.86
2	4	57.14
TOTAL	7	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	5	71.43
2	2	28.57
TOTAL	7	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	7	100.00
TOTAL	7	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
2	7	100.00
TOTAL	7	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	2	28.57
2	4	57.14
4	1	14.29
TOTAL	7	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	2	28.57
2	3	42.86
3	2	28.57
TOTAL	7	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
1	1	14.29
2	4	57.14
3	2	28.57
TOTAL	7	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
2	5	71.43
3	2	28.57
TOTAL	7	

TABLE A 15

SUMMARY STATISTICS - NON-QUANTITATIVE VARIABLES

PINDORAMA N = 42

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	4	9.52
2	27	64.29
3	11	26.19
TOTAL	42	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
1	1	2.38
2	37	88.10
3	2	4.76
4	2	4.76
TOTAL	42	

V3 LITERACY

CODE	FREQ.	PERCENT
1	16	38.10
2	26	61.90
TOTAL	42	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
1	2	5.41
2	8	21.62
3	13	35.14
4	14	37.84
TOTAL	37	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
1	5	19.23
2	15	57.69
3	1	3.85
4	5	19.23
TOTAL	26	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	10	23.81
2	20	47.62
3	9	21.43
5	3	7.14
TOTAL	42	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	18	45.00
2	13	32.50
3	9	22.50
TOTAL	40	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	14	46.67
2	16	53.33
TOTAL	30	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
1	14	42.42
2	11	33.33
3	8	24.24
TOTAL	33	

V10 EDUCATION

CODE	FREQ.	PERCENT
1	3	10.34
2	25	86.21
3	1	3.45
TOTAL	29	

V11 MEDIC.FACILT.

CODE	FREQ.	PERCENT
1	3	9.68
2	27	87.10
3	1	3.23
TOTAL	31	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
1	10	23.81
2	13	30.95
3	19	45.24
TOTAL	42	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	9	21.43
2	28	66.67
3	5	11.90
TOTAL	42	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	25	59.52
2	17	40.48
TOTAL	42	

V15 TENURE

CODE	FREQ.	PERCENT
1	6	24.00
2	1	4.00
3	4	16.00
4	14	56.00
TOTAL	25	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
1	1	2.38
2	41	97.62
TOTAL	42	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
2	42	100.00
TOTAL	42	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	4	9.52
2	38	90.48
TOTAL	42	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
1	1	2.38
2	41	97.62
TOTAL	42	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	1	2.38
2	41	97.62
TOTAL	42	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	32	76.19
2	10	23.81
TOTAL	42	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
2	41	97.62
3	1	2.38
TOTAL	42	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
1	7	16.67
2	15	35.71
3	20	47.62
TOTAL	42	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
2	31	73.81
3	3	7.14
4	2	4.76
5	6	14.29
TOTAL	42	

V25 CROP ONE

CODE	FREQ.	PERCENT
8	9	21.43
10	30	71.43
11	1	2.38
15	1	2.38
17	1	2.38
TOTAL	42	

V26 CROP TWO

CODE	FREQ.	PERCENT
0	1	2.38
1	3	7.14
4	2	4.76
8	13	30.95
9	1	2.38
10	6	14.29
11	3	7.14
15	7	16.67
17	2	4.76
20	4	9.52
TOTAL	42	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	4	9.52
1	5	11.90
3	1	2.38
4	3	7.14
8	4	9.52
10	2	4.76
11	11	26.19
15	6	14.29
16	2	4.76
17	3	7.14
20	1	2.38
TOTAL	42	

V28 ALW. SAME CROP

CODE	FREQ.	PERCENT
1	33	78.57
2	9	21.43
TOTAL	42	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	39	92.86
2	3	7.14
TOTAL	42	

V30 USES IRRIG.

CODE	FREQ.	PERCENT
2	42	100.00
TOTAL	42	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	38	90.48
2	4	9.52
TOTAL	42	

V32 WHY NOT

CODE	FREQ.	PERCENT
2	1	20.00
4	4	80.00
TOTAL	5	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	41	97.62
2	1	2.38
TOTAL	42	

V34 WHY NOT

CODE	FREQ.	PERCENT
4	1	100.00
TOTAL	1	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	21	50.00
2	21	50.00
TOTAL	42	

V36 MARKETS

CODE	FREQ.	PERCENT
1	40	95.24
2	2	4.76
TOTAL	42	

V37 PROP. SELLING

CODE	FREQ.	PERCENT
1	2	4.76
2	40	95.24
TOTAL	42	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
1	2	4.76
2	34	80.95
3	1	2.38
4	5	11.90
TOTAL	42	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	35	83.33
2	2	4.76
3	5	11.90
TOTAL	42	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
1	3	7.14
2	39	92.86
TOTAL	42	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	40	97.56
2	1	2.44
TOTAL	41	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	34	80.95
2	8	19.05
TOTAL	42	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
1	12	30.00
2	28	70.00
TOTAL	40	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	40	95.24
2	2	4.76
TOTAL	42	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	21	50.00
2	21	50.00
TOTAL	42	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	39	92.86
2	3	7.14
TOTAL	42	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
1	2	4.76
2	40	95.24
TOTAL	42	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	30	71.43
2	11	26.19
3	1	2.38
TOTAL	42	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	16	38.10
2	17	40.48
3	9	21.43
TOTAL	42	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
1	5	11.90
2	23	54.76
3	14	33.33
TOTAL	42	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
1	10	23.81
2	25	59.52
3	7	16.67
TOTAL	42	

SUMMARY STATISTICS - NON-QUANTITATIVE VARIABLES

TREZE N = 27

V1 PLACE OF BIRTH

CODE	FREQ.	PERCENT
1	23	85.19
2	4	14.81
TOTAL	27	

V2 MARITAL STATUS

CODE	FREQ.	PERCENT
1	1	3.70
2	24	88.89
3	1	3.70
4	1	3.70
TOTAL	27	

V3 LITERACY

CODE	FREQ.	PERCENT
1	7	25.93
2	20	74.07
TOTAL	27	

V4 ASPIR.FOR SONS

CODE	FREQ.	PERCENT
2	3	13.04
3	10	43.48
4	10	43.48
TOTAL	23	

V5 ASPIR.DAUGHTERS

CODE	FREQ.	PERCENT
2	10	66.67
3	1	6.67
4	4	26.67
TOTAL	15	

V6 PRIOR RESIDENCE

CODE	FREQ.	PERCENT
1	2	7.41
2	23	85.19
5	2	7.41
TOTAL	27	

V7 PRIOR WORK

CODE	FREQ.	PERCENT
1	16	59.26
2	8	29.63
3	3	11.11
TOTAL	27	

V8 FAM. WORKED

CODE	FREQ.	PERCENT
1	15	68.18
2	7	31.82
TOTAL	22	

V9 FOOD,CLOTHING

CODE	FREQ.	PERCENT
1	5	21.74
2	11	47.83
3	7	30.43
TOTAL	23	

V10 EDUCATION

CODE	FREQ.	PERCENT
1	1	5.26
2	12	63.16
3	6	31.58
TOTAL	19	

V11 MEDIC.FACILT.

CODE	FREQ.	PERCENT
1	1	4.35
2	9	39.13
3	13	56.52
TOTAL	23	

V12 HOUSING STAT.

CODE	FREQ.	PERCENT
1	8	29.63
2	15	55.56
3	4	14.81
TOTAL	27	

V13 HOUSING COND.

CODE	FREQ.	PERCENT
1	2	7.41
2	22	81.48
3	3	11.11
TOTAL	27	

V14 HAD LAND

CODE	FREQ.	PERCENT
1	16	59.26
2	11	40.74
TOTAL	27	

V15 TENURE

CODE	FREQ.	PERCENT
1	11	68.75
2	3	18.75
3	1	6.25
4	1	6.25
TOTAL	16	

V16 U. ORG. FERT.

CODE	FREQ.	PERCENT
1	18	66.67
2	9	33.33
TOTAL	27	

V17 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	4	14.81
2	23	85.19
TOTAL	27	

V18 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	27	100.00
TOTAL	27	

V19 U. MECH. POWER

CODE	FREQ.	PERCENT
1	1	3.70
2	26	96.30
TOTAL	27	

V20 MEMB. COOP.

CODE	FREQ.	PERCENT
1	3	11.11
2	24	88.89
TOTAL	27	

V21 EXP. SELLING

CODE	FREQ.	PERCENT
1	21	77.78
2	6	22.22
TOTAL	27	

V22 PAYMT. PROP.

CODE	FREQ.	PERCENT
1	9	33.33
2	2	7.41
3	16	59.26
TOTAL	27	

V23 HOUSING ASSIST.

CODE	FREQ.	PERCENT
1	9	33.33
2	15	55.56
3	3	11.11
TOTAL	27	

V24 CONSTRAINTS LAND

CODE	FREQ.	PERCENT
1	1	3.70
2	5	18.52
3	3	11.11
5	18	66.67
TOTAL	27	

V25 CROP ONE

CODE	FREQ.	PERCENT
3	1	3.70
11	1	3.70
18	25	92.59
TOTAL	27	

V26 CROP TWO

CODE	FREQ.	PERCENT
0	1	3.70
3	5	18.52
11	19	70.37
21	2	7.41
TOTAL	27	

V27 CROP THREE

CODE	FREQ.	PERCENT
0	5	18.52
3	5	18.52
8	1	3.70
11	3	11.11
13	3	11.11
14	7	25.93
15	2	7.41
18	1	3.70
TOTAL	27	

V28 ALW. SAME CROP

CODE	FREQ.	PERCENT
1	20	76.92
2	6	23.08
TOTAL	26	

V29 BURNS LAND

CODE	FREQ.	PERCENT
1	14	51.85
2	13	48.15
TOTAL	27	

V30 USES IPRIG.

CODE	FREQ.	PERCENT
2	27	100.00
TOTAL	27	

V31 U. CHEM. FERT.

CODE	FREQ.	PERCENT
1	19	70.37
2	8	29.63
TOTAL	27	

V32 WHY NOT

CODE	FREQ.	PERCENT
4	8	100.00
TOTAL	8	

V33 U. INSECTICID.

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V34 WHY NOT

CODE	FREQ.	PERCENT
TOTAL	0	

V35 CROP ROT.

CODE	FREQ.	PERCENT
1	22	81.48
2	5	18.52
TOTAL	27	

V36 MARKETS

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V37 PROP. SELLING

CODE	FREQ.	PERCENT
2	27	100.00
TOTAL	27	

V38 FAITH/SCIENCE

CODE	FREQ.	PERCENT
2	18	66.67
3	6	22.22
4	3	11.11
TOTAL	27	

V39 AGRONOMISTS

CODE	FREQ.	PERCENT
1	25	92.59
3	2	7.41
TOTAL	27	

V40 U. ANIM. POWER

CODE	FREQ.	PERCENT
2	27	100.00
TOTAL	27	

V41 EVER U. CREDIT

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V42 CREDIT EASY

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V43 CREDIT SOURCE

CODE	FREQ.	PERCENT
2	27	100.00
TOTAL	27	

V44 MEMB. COOP.

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V45 SATISF.W.ADMIN.

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V46 SATISF.LIFE AG.

CODE	FREQ.	PERCENT
1	27	100.00
TOTAL	27	

V47 LEAVE AG.

CODE	FREQ.	PERCENT
1	1	3.70
2	26	96.30
TOTAL	27	

V48 SUBJ. RATING

CODE	FREQ.	PERCENT
1	17	62.96
2	7	25.93
3	3	11.11
TOTAL	27	

V49 REL. COL/ADMIN.

CODE	FREQ.	PERCENT
1	18	66.67
2	9	33.33
TOTAL	27	

V50 SOC. LIFE

CODE	FREQ.	PERCENT
1	6	22.22
2	18	66.67
3	3	11.11
TOTAL	27	

V51 PHYSIOG.

CODE	FREQ.	PERCENT
1	20	74.07
2	6	22.22
3	1	3.70
TOTAL	27	

TABLE A17

AVERAGE MONTHLY PRECIPITATION FOR SELECTED STATIONS IN THE ZONA DA MATA

Month	Mamanguape Paraiba (Camaratuba) 1910	Recife Pernambuco (CRC Cabo) (Tiriri) 1910	Vitoria Pernambuco (CRC Vitoria) 1936	Panelas Pernambuco (Rio Bonito) 1934	Coruripe Alagoas (Pindorama) 1936	Lagarto Sergipe (Treze) 1955
January	81.3	77.3	45.4	31.0	38.6	38.4
February	109.8	97.0	57.5	32.8	48.7	41.0
March	215.4	167.9	102.0	66.1	119.1	76.3
April	201.9	207.8	105.9	82.7	199.7	125.1
May	235.4	283.2	129.7	86.3	265.3	147.4
June	262.1	273.7	134.6	81.3	215.0	126.0
July	175.0	230.2	89.0	63.2	178.9	116.1
August	104.7	150.6	60.8	44.3	112.6	75.5
September	48.6	65.8	35.9	29.6	65.8	56.0
October	22.4	36.0	20.6	13.5	45.3	40.6
November	32.0	35.1	22.7	21.8	26.5	53.0
December	55.6	41.6	31.1	21.5	38.7	42.6
Total (mm)	1534.7	1670.7	838.2	568.7	1344.0	939.5
(inches)	60.4	65.8	33.0	22.4	52.9	36.9

(25.4 mm equal 1.0 inch)

Source: SUDENE, Dados Pluviométricos Mensais, Volume II, MINTER - SUDENE, Departamento de Recursos Naturais, Divisão de Hidrologia.

TABLE A 18

RECOMMENDED FOOD CONSUMPTION FOR ADULT

PERSON LIVING IN NORTHEAST BRAZIL*

Animal Products	
Milk	150 gm
Cheese	10 gm
Meat	100 gm
Eggs	25 gm
Fruit and Vegetable	
Fruit	200 gm
Vegetable	150 gm
Cereals and Starchy Foods	
Cereals	100 gm
Pulses	30 gm
Root Vegetable	180 gm
Other	
Sugar	150 gm
Fats	45 gm

* Source: Maria Helena de Souza Martins, Necessidades Nutricionais do Nordestino, Departamento de Nutrição Humana. Pernambuco Institute of Nutrition, Recife, Mimeograph. 1970.

TABLE A 19

RETAIL PRICES FOR MAJOR FOOD ITEMS*

JUNE 1970

Item	Unit	Price U.S.$	Item	Unit	Price U.S.$
Beans	kg	0.35	Eggs	doz.	0.48
Rice	kg	0.28	Cheese	kg	1.40
Manioc Flour	kg	0.23	Cooking Oil	liter	0.56
Potatoes	kg	0.24	Fresh Meat	kg	1.10
Sw. Potatoes	kg	0.16	Dried Meat	kg	1.15
Yams	kg	0.18	Noodles	kg	0.34
Tomatoes	kg	0.20	Bread	kg	0.36
Oranges	100	1.20	Milk	liter	0.14
Bananas	100	0.80	Sugar	kg	0.19

RETAIL PRICES: HOUSEHOLD ITEMS*

Item	Unit	Price U.S.$	Item	Unit	Price U.S.$
Kerosene	liter	0.14	Bunk Bed	1	10.00
Crude Soap	kg	0.28	Straw Mattress	1	4.00
Charcoal	kg	0.05	Hammock	1	5.20
Coffee Pot	1	1.50	Charcoal Iron	1	2.40
Cooking Pot	1	1.50	Kerosene Lamp	1	1.00
Simple Table	1	4.00	Simple Sew.Mach	1	60.00
Simple Chair	1	1.80	Simple Radio	1	20.00

*Based upon retail prices in the City of Recife. Prices in the country stores of rural areas are normally somewhat higher. Calculations made on the basis of the June 1970 Exchange Rate of U.S. $1.00 = Cr 4.50.

TABLE A 20

PRICES FOR FARM SUPPLIES*

(June 1970)

	U.S.$
Manual Tools	
Hoe with Handle	1.20
Axe	1.40
Machete	1.60
Sickle	0.80
Knapsack Sprayer	42.00
Crop Duster	28.00
Tools for Animal Traction	
(Team of 2 oxen)	380.00
Cultivator	26.00
Plow	68.40
Grade	210.00
Seeder and Fertilizer Spreader	56.00
Mechanical Traction	
Rotovator (Japanese) 4hp	2,840.00
Massey Ferguson Tractor (44hp)	4,650.00
Cultivator (9 hoes)	442.00
Plow (3 disks)	556.00
Fertilizer (Price per ton)	
Ammonium Sulphate (20%)	56.00
Triple Superphosphate (45%)	94.00
Potassium Chlorate (62%)	73.00
Low Grade Organic Fertilizer (Castor bean residue)	16.00

*Source: Various Farm Supply Dealers in Recife.

TABLE A 21

ECONONOMIC IMPLICATIONS OF VARIOUS SUGAR CANE PRACTICES*

	Yield (tons/ha)	Price ($/ton)	Revenue ($/ha)	Return to Land & Labour ($/ha)	Implied Daily Wage (excluding cost of land) ($/day)	Implied Return to Land if Labour paid $.65/day ($/ha)
No Fertilizer ("Current Practices")						
planting year	35	4.8	168	145.3	1.10	59.5
2nd year	35	4.8	168	167.5	2.50	124.0
3rd year	35	4.8	168	167.5	2.50	124.0
Three Year Total				480.3	(1.81)	307.5
or (Weighted Average)						
Some Fertilizer						
planting year	50	4.8	240	170.4	1.12	71.6
2nd year	50	4.8	240	192.6	2.29	138.0
3rd year	50	4.8	240	192.6	2.29	138.0
Three Year Total				555.6	(1.74)	347.6
or (Weighted Average)						
Recommended Practices: fair yields						
planting year	80	4.8	384	184.0	1.05	70.2
2nd year	80	4.8	384	284.6	2.82	218.9
3rd year	80	4.8	384	337.0	3.40	272.6
Three Year Total				805.6	(2.15)	561.7
or (Weighted Average)						
Recommended Practices: good yields						
planting year	100	4.8	480	280.0	1.50	158.4
2nd year	100	4.8	480	380.6	3.37	307.1
3rd year	100	4.8	480	433.0	3.90	360.7
Three Year Total				1093.6	(2.66)	826.2
or (Weighted Average)						

* Kenneth D. Frederick, Agricultural Development in the Brazilian Northeast: Technological Alternative and Probable Development Patterns, (unpublished report prepared for the United States Agency for International Development, Washington,D.C., December 1970) Appendix A, Table A-2.

TABLE A 22

COST BENEFIT ANALYSIS *

CUCAU SETTLEMENT

TOTAL INVESTMENT	U.S.$ 1,020,368
INVESTMENT PER FAMILY	U.S.$ 3,924

EXPECTED GROSS RETURN

	U.S.$
Year I	1,128
Year II	4,019
Year III	4,799
Year IV	5,488

GROSS RETURN YEAR IV

PRODUCT	AREA	VOLUME	VALUE U.S.$
Sugar Cane	7.5 ha	270 Tons	1,644
Pineapple	2.0 ha	18,188 Fruit	1,212
Banana	1.0 ha	164,985 Fruit	696
Subsistence Crops	1.5 ha	-	-
Rabbits		2,656 Kg	1,772
Hides		1,476	164
Total	12.0 ha		$ 5,488

FARM EXPENDITURES	$ 2,510
ICM, INTEREST, TAXES	1,325
TOTAL EXPENSES	$ 3,835
ANNUAL NET INCOME	1,652

TOTAL INITIAL INVESTMENT	U.S.$1,020,368
TOTAL VALUE OF AGRICULTURAL PRODUCTION AFTER YEAR IV	U.S.$ 1,426,937
CAPITAL TURNOVER	0.71

Source: GERAN. Projeto de Recolonização Cucau. Publicação No. 3/70, Maio de 1970.

* Values were converted from Cruzeiro to U.S. Dollar at May 1970 exchange rate of Cr$4.50 = U.S.$1.00.