CURRENCY EQUIVALENTS

Currency Unit: Cruzeiro

Exchange Rates Effective June 20, 1977

Selling Rate: US$1.00 = Cr$14.00
US$1 million = Cr$14 million
Cr$1 million = US$71,429

Buying Rate: US$1.00 = Cr$13.93

Average Exchange Rates (Selling)

<table>
<thead>
<tr>
<th></th>
<th>1974</th>
<th>1975</th>
<th>1976</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$1.00</td>
<td>Cr$6,843</td>
<td>Cr$8,204</td>
<td>Cr$10,786</td>
</tr>
<tr>
<td>US$1 million</td>
<td>Cr$6,843,000</td>
<td>Cr$8,204,000</td>
<td>Cr$10,786,000</td>
</tr>
<tr>
<td>Cr$1 million</td>
<td>US$146,134</td>
<td>US$121,892</td>
<td>US$92,712</td>
</tr>
</tbody>
</table>

GLOSSARY OF ACRONYMS

ENDE - Banco Nacional do Desenvolvimento Economico (National Economic Development Bank)

CIBRAZEM - Companhia Brasileira de Armazenamento (Brazilian Agricultural Storage Company)

CODERAT - Companhia de Desenvolvimento do Estado do Mato Grosso (Mato Grosso State Development Company)

CONTAG - Confederacao Nacional de Trabalhadores Agricolas (National Confederation of Agricultural Workers)

DNOS - Departamento Nacional de Obras e Saneamento (National Sanitation Department)

EMBRAPA - Empresa Brasileira de Pesquisa Agropecuaria (Brazilian Enterprise for Agricultural Research)

EMBRATER - Empresa Brasileira de Assistencia Tecnica e Extensao Rural (Brazilian Enterprise for Technical Assistance and Rural Extension)

FGV - Fundacao Getulio Vargas (Getulio Vargas Foundation)

IDAGO - Instituto de Desenvolvimento Agrario de Goias (Goias Agrarian Development Institute)

INCRA - Instituto Nacional de Colonizacao e Reforma Agraria (National Institute of Colonization and Agrarian Reform)

INDECO - Private Land Development Company

PIN - Programa de Integração Nacional (National Integration Program)

PND II - Plano Nacional de Desenvolvimento (Second National Development Plan)

POLAMAZONIA - Programa de Polos Agropecuarios e Agro Minerais da Amazonia (Program of Agricultural and Agro-Mineral Poles of the Amazon)

POLOCENTRO - Programa de Desenvolvimento dos Cerrados (Savannah (Cerrados) Development Program)

PRODEGRAN - Programa Especial de Desenvolvimento do Grande Dourados (Special Development Program for the Greater Dourados Region)

PRODEPAN - Programa Especial de Desenvolvimento do Pantanal (Special Development Program of the Pantanal)

PRODOESTE - Programa de Desenvolvimento do Centro-Oeste (Central-West Development Program)

PROTERA - Programa de Redistribuicao de Terras e de Estimulo a Agro-Industria do Norte e Nordeste (Land Redistribution Program)

RADAM - Radar Amazonia

SUDAM - Superintendencia para o Desenvolvimento da Amazonia (Superintendency for the Development of the Amazon Region)

SUDECO - Superintendencia do Desenvolvimento da Regiao Centro-Oeste (Superintendency for the Development of the Central-West)
PREFACE

This report is based on the findings of a mission to Brazil in October-November 1975 composed of:

David E. Goodman (Chief of Mission)
Jacomina de Regt (Loan Officer)
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## Country Data - Brazil

### Area

| Area       | 2,512,000 km² |

### Population

<table>
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<th>Population Characteristics (1975)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Birth Rate (per 1,000)</td>
<td>37.1</td>
</tr>
<tr>
<td>Crude Death Rate (per 1,000)</td>
<td>8.8</td>
</tr>
</tbody>
</table>

### Density (1975)

| Density (1975) | 13.0 per km² |

### Population Characteristics (1975)

<table>
<thead>
<tr>
<th>Income Distribution (1970)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% of National Income, Highest Quintile</td>
<td>62.0</td>
</tr>
<tr>
<td>% of National Income, Lowest Quintile</td>
<td>3.0</td>
</tr>
</tbody>
</table>

### Access to Piped Water (1972)

<table>
<thead>
<tr>
<th>Access to Piped Water (1972)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Population with Piped Water</td>
<td>33.0</td>
</tr>
</tbody>
</table>

### Nutrition (1971-73)

<table>
<thead>
<tr>
<th>Nutrition (1971-73)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calorie Intake as % of Requirements</td>
<td>115.0</td>
</tr>
<tr>
<td>Per Capita Protein Intake (grams/day)</td>
<td>67.0</td>
</tr>
</tbody>
</table>

### Health (1972)

<table>
<thead>
<tr>
<th>Health (1972)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population per Physician</td>
<td>1,650</td>
</tr>
<tr>
<td>Population per Hospital Bed</td>
<td>260</td>
</tr>
</tbody>
</table>

### Distribution of Land Ownership (1970)

<table>
<thead>
<tr>
<th>Distribution of Land Ownership (1970)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% Owned by Top 10% of Owners</td>
<td>45.0</td>
</tr>
<tr>
<td>% Owned by Smallest 10% of Owners</td>
<td>1.5</td>
</tr>
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</table>

### Access to Electricity (1972)

<table>
<thead>
<tr>
<th>Access to Electricity (1972)</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>% of Population - Total</td>
<td>53.0</td>
</tr>
<tr>
<td>% of Population - Rural</td>
<td>11.0</td>
</tr>
</tbody>
</table>

### Education (1970)

<table>
<thead>
<tr>
<th>Education (1970)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Adult Literacy Rate %</td>
<td>68.0</td>
</tr>
<tr>
<td>Primary School Enrollment %</td>
<td>87.0</td>
</tr>
</tbody>
</table>

### GNP per Capita in 1975: US$1010

### Gross National Product in 1975

<table>
<thead>
<tr>
<th>GNP at Market Prices</th>
<th>US $ Mln.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Investment</td>
<td>25,182</td>
<td>23.4</td>
</tr>
<tr>
<td>Gross National Saving</td>
<td>19,705</td>
<td>18.3</td>
</tr>
<tr>
<td>Current Account Balance</td>
<td>6,712</td>
<td>6.2</td>
</tr>
<tr>
<td>Exports of Goods, NFS</td>
<td>9,255</td>
<td>8.6</td>
</tr>
<tr>
<td>Imports of Goods, NFS</td>
<td>14,296</td>
<td>13.3</td>
</tr>
</tbody>
</table>

### Annual Rate of Growth (% constant prices)

<table>
<thead>
<tr>
<th>Annual Rate of Growth (% constant prices)</th>
<th>1970-73</th>
<th>1974-75</th>
<th>1975</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNP at Market Prices</td>
<td>11.4</td>
<td>6.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Gross Domestic Investment</td>
<td>19.5</td>
<td>7.2</td>
<td>-6.6</td>
</tr>
<tr>
<td>Gross National Saving</td>
<td>18.5</td>
<td>1.2</td>
<td>-5.3</td>
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<tr>
<td>Current Account Balance</td>
<td>18.0</td>
<td>5.2</td>
<td>-</td>
</tr>
<tr>
<td>Exports of Goods, NFS</td>
<td>21.0</td>
<td>7.2</td>
<td>-10.9</td>
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### Output, Employment and Productivity in 1975

<table>
<thead>
<tr>
<th>Output, Employment and Productivity in 1975</th>
<th>Value Added</th>
<th>Employment</th>
<th>V. A. Per Worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>17,598</td>
<td>15.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Industry</td>
<td>38,532</td>
<td>32.8</td>
<td>6.4</td>
</tr>
<tr>
<td>Services</td>
<td>61,194</td>
<td>52.2</td>
<td>13.2</td>
</tr>
<tr>
<td>Total/Average</td>
<td>117,324</td>
<td>100.0</td>
<td>32.4</td>
</tr>
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</table>

### Government Finance

<table>
<thead>
<tr>
<th>Government Finance</th>
<th>Central Government b/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Cr$ Mln.)</td>
<td>% of GDP</td>
</tr>
<tr>
<td>Current Receipts</td>
<td>166,120</td>
</tr>
<tr>
<td>Current Expenditure</td>
<td>101,272</td>
</tr>
<tr>
<td>Current Surplus</td>
<td>64,968</td>
</tr>
<tr>
<td>Capital Expenditures</td>
<td>66,999</td>
</tr>
</tbody>
</table>

a/ The Per Capita GNP estimate calculated by the same conversion technique as the World Bank Atlas. All other conversions to dollars in this table are at the average exchange rate prevailing during the period covered.

b/ Cash accounts.
### Country Data - Brazil

#### Money, Credit and Prices

<table>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Money Supply (Million Cr$ outstanding end period)</td>
<td>61,550</td>
<td>90,490</td>
<td>120,788</td>
<td>172,433</td>
<td>236,506</td>
</tr>
<tr>
<td>Bank Credit to Public Sector</td>
<td>..</td>
<td>5,297</td>
<td>8,203</td>
<td>12,287</td>
<td>23,621</td>
</tr>
<tr>
<td>Bank Credit to Private Sector</td>
<td>81,560</td>
<td>119,324</td>
<td>189,663</td>
<td>297,278</td>
<td>461,347</td>
</tr>
</tbody>
</table>

#### Money as % of GDP

<table>
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<tr>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>General Price Index (1965-67=100)</td>
<td>324</td>
<td>373</td>
<td>480</td>
<td>613</td>
<td>866</td>
</tr>
</tbody>
</table>

#### General Price Index

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank credit to Public Sector</td>
<td>n/a</td>
<td>n/a</td>
<td>54.9</td>
<td>49.8</td>
<td>92.2</td>
</tr>
<tr>
<td>Bank credit to Private Sector</td>
<td>41.6</td>
<td>46.3</td>
<td>59.0</td>
<td>56.7</td>
<td>55.2</td>
</tr>
</tbody>
</table>

#### Balance of Payments

<table>
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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports of Goods, NFS</td>
<td>6,596</td>
<td>8,471</td>
<td>9,255</td>
<td>10,657</td>
</tr>
<tr>
<td>Imports of Goods, NFS</td>
<td>7,377</td>
<td>14,678</td>
<td>16,296</td>
<td>18,435</td>
</tr>
<tr>
<td>Resource Gap (deficit = -)</td>
<td>-981</td>
<td>-6,207</td>
<td>-5,037</td>
<td>-3,778</td>
</tr>
<tr>
<td>Interest Payments (net)</td>
<td>-514</td>
<td>-652</td>
<td>-1,463</td>
<td>-1,758</td>
</tr>
<tr>
<td>Other Factor Payments (net)</td>
<td>-220</td>
<td>-264</td>
<td>-272</td>
<td>-530</td>
</tr>
<tr>
<td>Net transfers</td>
<td>27</td>
<td>1</td>
<td>-4</td>
<td></td>
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<tr>
<td>Balance on Current Account</td>
<td>-1,688</td>
<td>-7,122</td>
<td>-6,712</td>
<td>-6,062</td>
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#### Direct Private Foreign Investment

<table>
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<th></th>
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</tr>
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<tbody>
<tr>
<td>Net MLT Borrowing Disbursement</td>
<td>4,558</td>
<td>7,059</td>
<td>6,727</td>
<td>8,406</td>
</tr>
<tr>
<td>Amortization</td>
<td>1,672</td>
<td>1,920</td>
<td>2,120</td>
<td>2,872</td>
</tr>
<tr>
<td>Subtotal</td>
<td>2,886</td>
<td>5,139</td>
<td>4,607</td>
<td>5,534</td>
</tr>
</tbody>
</table>

#### Other Capital (net) and capital n.e.i.

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</tr>
</thead>
<tbody>
<tr>
<td>Increase in Reserves (+)</td>
<td>2,559</td>
<td>-933</td>
<td>-1,046</td>
<td>2,193</td>
</tr>
<tr>
<td>Cross Reserves (end year)</td>
<td>6,551</td>
<td>5,598</td>
<td>4,552</td>
<td>6,745</td>
</tr>
<tr>
<td>Petroleum Imports a/</td>
<td>711</td>
<td>2,840</td>
<td>2,838</td>
<td>3,585</td>
</tr>
<tr>
<td>Petroleum Exports a/</td>
<td>82</td>
<td>63</td>
<td>141</td>
<td>53</td>
</tr>
</tbody>
</table>

#### Rate of Exchange (Selling)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>US $ 1.00 = Cr $ 8.204</td>
<td>US $ 1.00 = Cr $ 10.786</td>
<td>Outstanding &amp; Disbursed</td>
<td>1,217</td>
</tr>
<tr>
<td>Cr $ 1.00 = US $ 0.122</td>
<td>Cr $ 1.00 - US $ 0.093</td>
<td>Outstanding incl. Undisbursed</td>
<td>7,556</td>
</tr>
</tbody>
</table>

**a/** Crude and derivatives.

**b/** Debt Service net of interest earned on foreign exchange reserves as a percentage of Exports of Goods and Non-Factor Services.
Introduction

The Central-West Region of Brazil, conventionally defined as the states of Mato Grosso and Goias and the Federal District of Brasilia, covers 1.9 million square km or 22% of the total area of the country. This area contains one of the world’s last great agricultural frontiers. The rate of settlement of the region has been increasing over the past decade and the Government of Brazil is committed to accelerating the development of the region’s agricultural sector over the next five years. The development of this vast area could play a major role in alleviating rural poverty in Brazil by accommodating migration from poor areas of the country. However, the Government appears to have opted for a strategy to maximize the rate at which new lands are brought into cultivation. One objective of this strategy is to achieve a rapid increase in the production of export crops which would alleviate the country’s balance-of-payments situation. This raises the issue whether the Government’s strategy is so strongly oriented to large-scale commercial enterprises that it does not assign an adequate role to smaller producers even when economy-of-scale considerations indicate that their operations would be efficient.

Physical Aspects and Geographical Resources

The vast territory of the Central-West Region of Brazil encompasses climatological zones ranging from semi-equatorial in the north to semitemperate in the south. Rainfall is abundant over practically all the region in the north, ranging from 2,000 mm in the northern part of Mato Grosso to about half that level in the southwestern part of that state. There is, however, a pronounced dry season in most of the region lasting from 4-6 months. The major constraint on the agricultural development of the region appears to be soil quality. However, with modern technology and substantial soil preparation, land throughout the Central-West Region can be utilized successfully for crop production and fairly extensive livestock operations.

Four major physiographic zones can be distinguished. The pre-Amazonian tropical forest of northern Mato Grosso and northern Goias, the agricultural potential of which remains to be determined, forms a transitional zone between the equatorial climate and forests of the lower Amazon Basin and the second major zone of the Central-West Region, the Brazilian savannah or cerrado. This zone extends over two-thirds of Goias and one-third of Mato Grosso in the Central Brazilian plateau. The vegetation of the cerrado varies from dense scrub and plentiful trees to open grasslands and low, stunted bush. Cerrado soils are generally sandy, acidic and infertile but are suitable for mechanized agriculture with liming and chemical fertilization. The traditional activity in this area is extensive cattle-ranching. The third zone, alluvial flood plain, includes the Bananal Region in northeastern Mato Grosso and western Goias which may have a potential for irrigated rice production, as well as the immense Pantanal Region in southwestern Mato Grosso, part of the Paraguay Depression which
embraces the Gran Chaco Region of Bolivia and Paraguay. The Pantanal is an area of extensive beef cattle production not suited to crop production given soil quality and alternate flooding and drought which characterize much of the area. Finally, in southern Mato Grosso, south of the 20th parallel, is a region of grasslands (campo) which also includes areas of subtropical forest with high natural fertility and well suited to intensive agriculture. This region has a high altitude subtropical climate with cool winters including occasional frosts and a rainfall of 1,000-2,000 mm well distributed throughout the year.

The Regional Economy

iv. The population of the Central-West Region was 5.2 million in 1970 according to the demographic census, representing 5.4% of Brazil's total population. Regional population grew at 5.6% in the years 1950-70, significantly above the national growth rate of 3% for the same period. High rates of positive net migration induced by the opening up of new agricultural lands in Goias and Mato Grosso provide the main explanation of this rapid demographic expansion. Three major channels of migration to the Central-West Region can be distinguished. First, migration from the rural interior of the poor Northeast Region into northern and central Goias and then south towards Brasilia or west into Mato Grosso. A second migratory flow, oriented towards southern Mato Grosso, originates in Parana and Sao Paulo. The third major migratory current moves north and northwest from the poor, overpopulated areas of owner-operated family farms and minifundia in Rio Grande do Sul and Santa Catarina in the extreme south of Brazil. The concentration of population in certain relatively developed agricultural regions in the south of Goias and Mato Grosso and in several major urban centers (particularly Brasilia, Goiania, Campo Grande, Anapolis and Cuiaba) accentuates the frontier character of the rest of the Central-West Region.

v. The central importance of agricultural activities in regional net product is clear, despite its decline to 37.4% in 1970 with the significant expansion of tertiary activities which include the rapidly growing central government functions in Brasilia. The sectoral distribution of the labor force, with 53.8% in primary activities in 1970 confirms that these are the principal base of the regional economy. Regional net product expanded at an average annual rate of 10.5% in real terms during the years 1949-70 and the growth of real income per head in the Central-West Region has averaged 5%. In 1970, regional per capita income was US$313 per year on 65% of the national average. Industrial activity in the Central-West Region is limited and little diversified. In the immediate future, industrial diversification is likely to be based on the exploitation of timber resources, including several valuable hardwood species, and mineral reserves.

vi. Beef cattle production in the Central-West Region, as elsewhere in Brazil, typically involves extensive methods on unimproved natural range. Cattle-carrying capacities of natural pasture are low due to the marked dry season which affects much of the region. These climatic factors constrain animal growth and result in a relatively high average age at slaughter. Conditions in the Central-West Region are aggravated by the rudimentary
infrastructure of many cattle-raising areas, particularly transport facilities. Heavy weight losses are sustained in cattle drives to distant railheads or long trucking distances.

vii. Agriculture is the mainspring of growth and employment in the Central-West Region. Economically, the Central-West Region is the frontier of the dynamic industrialized Center-South Region with Sao Paulo at its hub which provides the principal market for its major cash crops. The major urban places of the Central-West Region, such as Goiania, Anapolis, Campo Grande and Cuiaba, function largely as collection and distribution centers.

viii. Even during the 1960s, the Central-West area was making a significant contribution to Brazil's agricultural growth. While Brazil's land in farms increased by 17% from 1960 to 1970, the Central-West Region's area in farms was growing twice as fast, by 35%. During the 1960s, 10.5% of new agricultural employment was in the Central-West Region. The rapid growth of the area has continued and probably accelerated in the 1970s. Rice remains the most important crop but soybean cultivation has increased dramatically from 5,000 ha in 1968 to 146,000 ha in 1973. Historically, agricultural expansion in Brazil has been sustained by extending the area under cultivation rather than by raising productivity. If agricultural yields were to continue constant, with a tendency to decline in long settled areas, then the incorporation of new crop land in the Central-West Region would represent an important mechanism for maintaining agricultural output growth. Furthermore, since the land in crops still represents only 1.3% of the total area of the Central-West Region, its role in meeting domestic market requirements and export demand undoubtedly will become increasingly significant.

ix. The 1970 agricultural census indicated clearly the extent to which the region is dominated by large farm establishments and the relatively insignificant role played by very small farms. This highly concentrated pattern of land ownership implies similar concentration in the distribution of income and wealth. Of the Central-West area in rural properties, 83% is held in properties classified by INCRA (National Institute of Colonization and Agrarian Reform) as latifundios by use -- that is uncultivated or inadequately exploited and over 600 times the size required to provide a subsistence income for a farm family with a labor force equivalent to four adults. The latifundio-minifundio dichotomy characterizing agrarian structure in long settled regions such as the Northeast is clearly in the process of being reproduced on the agricultural frontier of the Central-West Region. A major policy issue is whether this could be avoided rather than encouraged by government development programs.

x. Estimates of regional income distribution in 1970 give a Gini-coefficient of 0.49 for the Central-West Region, well below the Gini-coefficient of 0.57 for Brazil as a whole. Nevertheless, regional income is heavily concentrated and the share of the lowest 40% of the population in income is only 14%. If absolute poverty is defined by reference to an income per head of one-third the national average, then approximately 30% of the Central-West Region's population would be included.
Federal Economic Policy in the Central-West Region

xi. The settlement and development of the Central-West Region, the so-called marcha para o oeste (march to the west), has long stirred the Brazilian imagination, but government action to realize these aims was sporadic before 1970. Despite this, the cumulative effect of several federal initiatives have given marked impetus to the economic growth of the Central-West Region. In the later 1950s, these initiatives included the construction of Brasilia, the new national capital, and the Belem-Brasilia highway which links the agricultural frontier zones in the northern and central areas of Goias with the relatively well developed Goiania-Anapolis Region and thence with major consumer centers.

xii. In the 1960s, regional development agencies were established for the Central-West Region and the legally defined Amazon Region which partly overlaps with the Central-West. These agencies depended largely on fiscal incentives similar to those established earlier for the Northeast Region. There was little connection between the various regional programs. However, the calamitous drought of 1970 in the Northeast evoked a radical revision of the country’s regional development policy. The National Integration Program (PIN), introduced in June 1970, attempted an approach which emphasized regional complementarity. In broad terms, the PIN strategy seeks to attenuate the development problems in the heavily populated Northeast by accelerating the settlement and economic expansion of the North and Central-West Regions. During the first phase of the PIN strategy, which roughly coincided with the First National Development Plan of 1972-74, the Amazon Region was the principal recipient of investment resources, about half of which were devoted to transportation infrastructure. The PIN strategy was subsequently reinforced by the Land Redistribution Program (PROTERRA - Programa de Redistribution de Terras e de Estimulo a Agro-Industria do Norte e Nordeste) whose direct impact on the Central-West is restricted to the northern parts of Mato Grosso and Goias which are legally considered parts of the Amazon. In practice, the lion’s share of PROTERRA resources have been absorbed in infrastructure projects rather than, as the program’s name would imply, land reform. This orientation is continuing.

xiii. In November 1971, a new regional program, the Central-West Development Program (PRODOESTE - Programa de Desenvolvimento do Centro-Oeste), was introduced. PRODOESTE followed firmly along the lines of other "integration programs" in its emphasis on roads and rural infrastructure, though there is no reason to suggest that this emphasis was misplaced since the Central-West Region lacked even a rudimentary network of all-weather roads linking production areas with transhipment centers and commercial entrepots. The road construction and paving projects undertaken as part of this program represented a major step towards the transformation of this situation.

Recent Regional Development Initiatives

xiv. Although the PIN and PROTERRA programs have been extended until 1979, a new array of regional development programs has been introduced since 1974. The main federal Government programs instituted in 1974/75 for the
Central-West Region are the following: (i) the Program of Agricultural and Agro-Mineral Poles of the Amazon (POLAMAZONIA), (ii) the Cerrados Development Program (POLOCENTRO), (iii) the Special Program for the Geo-Economic Region of Brasilia, (iv) the Special Development Program of the Pantanal (PRODEPAN), and (v) the Special Program for the Greater Dourados Region of Southern Mato Grosso (PRODEGRAN). The current regional policies may be distinguished from their predecessors principally by their greater selectivity in choice of target areas and greater adaptation of each program to the specific characteristics of these target areas. The new programs derive from the "growth pole" concept. The principal objective of these programs is to open up isolated regions in the North and Central-West for settlement and so extend the area under cultivation. The emphasis on short-run output expansion and the measures adopted to achieve this goal, largely investments in infrastructure and subsidized credit to farmers and ranchers, impart a strong efficiency or production orientation to the new strategy. This orientation also is reflected in the central role assigned to the commercially organized farm establishment empresa agricola, in the settlement of areas incorporated in these programs. It means that the direct beneficiaries of rural credit and public overhead capital formation would tend to be concentrated in the upper quintile of the rural income distribution. The bottom two quintiles of this distribution would benefit indirectly, mainly via the permanent employment opportunities generated by this type of settlement. In other words, the land occupation model advanced by POLAMAZONIA and POLOCENTRO tends to reproduce the latifundo-minifundo complex of farm ownership and the income distribution associated with concentrated land ownership. This orientation has been modified in the case of POLAMAZONIA by the re-allocation of program financing to the Territory of Rondonia since 1975 in order to execute programs for small-scale agriculture, colonization and land titling.

xv. The Government has been concerned about the ecological dangers of primitive, shifting agricultural practices in the pre-Amazon and cerrado areas of the Central-West Region and this, to some extent, explains concentration on the empresa agricola. Direct beneficiaries of the program's special highly subsidized credit lines are required to adopt techniques and farming practices (including contour plowing, fertilization and liming) which maintain fertility and prevent soil erosion. In this sense, POLOCENTRO is a serious attempt to arrest frontier occupation based on itinerant patterns of cultivation in favor of permanent settlement. But these programs are limited spatially to selected areas and thus do not offer a global settlement strategy.

xvi. The new regional development programs raise several other important questions regarding development strategy. The POLAMAZONIA program, for example, is initiating settlement in vast, isolated and virtually unpopulated wilderness areas such as the Aripuana and Juruena areas of northern Mato Grosso. Spontaneous settlement would proceed very slowly in these regions in the absence of federal and state financed penetration roads and other indirect forms of encouragement. Migratory flows from the Northeast and Center-South Regions would instead have to continue to be directed along existing roads towards the sparsely populated areas of Goias, Central Mato Grosso and Rondonia where absorptive capacity significantly exceeds the probable magnitude of rural
in-migration, especially if settlement policies to establish family size farms and colonization projects were put into practice. Recent policy decisions appear to recognize that northern Mato Grosso's potential for supporting permanent agriculture remains to be established and have reduced financial allocations for road construction in Aripuana.

xvii. In macroeconomic policy statements, occupation of agricultural frontier areas such as the Central-West is assigned a major role in the creation of productive employment opportunities and improving the access of landless migrants to land ownership. However, the heavily subsidized POLOCENTRO credit programs focus mainly on large, commercially organized establishments. The rationale for this policy apparently rests on the assumption that the recommended technology in cerrado areas is beyond the absorptive capacity (financial and technical) of small farmers. It is not clear, however, that the recommended technology is efficient only for large-scale applications.

Frontier Occupation and Agricultural Settlement

xviii. Historically, the process of frontier occupation in the Central-West has had three major phases: (i) the pioneer phase, (ii) rural stratification and land consolidation, and (iii) the development of large-scale individual and corporate agricultural enterprises. In the first phase, the pioneer migrant worker seeking land to cultivate for immediate subsistence needs is the prime mover. Invading public lands or unexploited areas on private land holdings, migrants begin the process of land clearance, practicing a primitive slash-and-burn agriculture. The length of continuous cultivation possible with rudimentary subsistence methods will depend upon soil characteristics and other ecological factors. However, removal of the forest cover and continuous cropping generally will lead to leaching and soil depletion after two to three years. The areas abandoned in this process will be invaded by native grass and revert to dense undergrowth as the migrants move on to clear new areas. However, once cleared, the land can support extensive cattle-ranching operations and its subsequent preparation for permanent cash crops is greatly simplified. In short, the inflow of migratory labor seeking the means of subsistence enhances land values and accelerates the incorporation of frontier areas into the economic system. Small concentrations of subsistence farmers may persist where natural soil fertility remains relatively high and if they have shown sufficient tenacity to resist rival claimants. This resistance may have attracted political recognition and support leading to the formation of a public settlement by the state government. In the second phase, out-migration of pioneer settlers from arable areas and public settlements and the subsequent consolidation of fragmented land holdings are the principal features. Relatively wealthy settlers will grasp opportunities to extend their holdings by purchase or force. The third phase reinforces the consolidation and stratification process. It is marked by the appearance of commercial owner-operator establishments and the entry of large-scale corporate enterprises as can be seen in the south of Mato Grosso. Using agricultural machinery and other advanced cultivation techniques, these enterprises reestablish cropping as opposed to extensive ranching as the major agricultural activity.
The process of opening up and incorporating frontier lands, when placed in historical perspective, creates conditions for the reproduction of a latifundia-minifundia pattern. Small farmers with some resources and technical expertise at their command probably will manage to remain in the interstices of this highly unequal land ownership structure. However, the landless subsistence worker and illiterate, resource-poor farmer will move forward, rejoining the onward migration to the pioneer frontier areas. The fundamental challenge of frontier settlement policy is to ensure that these poor rural population groups gain access to the land and are given sufficient institutional support to make their tenure permanent.

Public policy may either encourage the continuation of the historical pattern of spontaneous settlement or seek to alter it either by pursuing a different final outcome or eliminating one or more of the phases. Moving from the highest degree of public sector involvement to the least, a preliminary taxonomy of the settlement processes which have characterized the recent opening up of the agricultural frontier areas in the Central-West includes the following: (i) public colonization schemes, (ii) settlement by private colonization companies, (iii) sale of public lands, and (iv) spontaneous occupation and settlement.

Public colonization projects have been undertaken in Mato Grosso by both the federal Government, principally the Dourados and Iguatemi projects in the southern part of the state, and the state government, which currently has over 40 projects under its supervision. The federal projects, involving some 10,600 families on holdings of 30 to 60 ha each are examples of controlled or directed settlement in previously selected areas where official agencies can exercise close control over the design and execution of colonization. The state government schemes, which embrace less than 2% of the state’s area, have evolved largely as an ad hoc response to land tenure problems arising in the course of rural migration and settlement. The present state government and the state development agency responsible for colonization programs, CODEMAT, are actively seeking to implement new settlement projects. This agency received assistance from the FAO-IBRD Cooperative Program in designing a colonization project in the Aripuana area of northern Mato Grosso. However, the federal government is unlikely to support state colonization schemes in this region before the 1980s and it is concentrating its efforts on settlement projects and land titling activities in Rondonia.

Following legislation in 1949 authorizing the sale of public land to private colonization companies, some 20 such companies were organized in Mato Grosso in the years 1951-53 and roughly 4.0 million ha reserved for these projects. The vast majority of these companies failed to satisfy conditions for constructing physical and social infrastructure prior to receiving legal title, and their projects were for the most part abandoned. In more recent years, however there has been renewed interest in private colonization, particularly following the advent of PROTERRA in 1971. This federal program includes credit lines to finance land purchase for agricultural projects and private colonization schemes in the area of Amazonia Legal. Several large tracts of land in the Juruena region of northwestern Mato Grosso have been sold by the state government to private land development companies which
have been delegated responsibility for frontier occupation. To date, there is a wide range of private colonization schemes which differ in terms of project characteristics and results achieved. This diversity, and the limited direct evidence available for many projects given their relatively short history, suggests that it would be premature to assess this recent experience in detail. Nevertheless, state and federal Government officials indicate that large-scale private colonization projects will have an important role in the settlement strategy of the Central-West Region, particularly in northern Mato Grosso.

xxiii. Budgetary and personnel constraints in the public sector are largely responsible for this decision. But support for private schemes, as well as land sales to large farm enterprises, also springs from official concern that migrants will invade public lands, creating acute land tenure problems and areas of uneconomic minifundia agriculture. This concern is legitimate, particularly when uncontrolled occupation leads to soil exhaustion and shifting patterns of cultivation. However, land sales to large-scale private undertakings may not represent the best alternative to spontaneous settlement by small farmers. This policy does not assuage the land hunger of the poor; it merely erects property barriers to access to land previously in the public domain. In seeking to avoid immediate tenure problems, more severe difficulties may be generated as the availability of new lands for settlement is exhausted. The task of devising settlement policies which give employment and income opportunities to the poor and landless cannot be postponed indefinitely.

xxiv. Much of the preceding discussion can be extended to frontier development undertaken via sales of public land to private enterprises for direct agricultural use. It appears that sales of public land by auction will be an integral part of frontier settlement policy in the late 1970s. In some respects, the auction system, with some minimum participation by the public sector, represents a compromise between directed state colonization and the outright, unconditional sale of land to private investors. Its place on this spectrum depends on the conditions imposed by the Government, particularly the size of holdings auctioned, the terms of purchase, access to land credit and subsequent provision. Ceteris paribus, equity considerations would favor the sale of small land parcels. The selection of land use and cropping patterns which expand the supply of permanent rural employment opportunities also would receive emphasis. Within the auction system, some limited scope thus remains for the introduction of equity criteria. For example an upper as well as lower limit might be placed on the size of parcels which could be auctioned to a given juridical or natural person. These limits would be related to the economic potential of the land and designed to prevent the formation of latifundia as well as minifundia. Requirements could be introduced regarding economic development of all auctioned land within some period, say three years, to avoid purely speculative transactions.

xxv. Spontaneous settlement is the invasion and occupation of unexploited or underutilized land. Permitting spontaneous settlement to take place amounts to a policy of laissez-faire. Whether on public lands or private property, the invasions tend to generate conflict over occupancy rights and title. In
Mato Grosso land invasion is not solely carried out by poor, landless migrants. Private enterprises with strong financial support also resort to this tactic as a means to secure occupancy rights on public lands. Large-scale private interests are thus rivals, as well as occasional allies, of small subsistence farmers in land invasion. Both the frequency and complexity of land disputes are increased by fraudulent practices involving illegal property transactions and the sale of false title deeds. These activities have accompanied the settlement process throughout the Central-West Region and greatly complicate the task of land-titling.

National Colonization and Land Reform Institute (INCRA) and Land Titling

xxvi. In Brazil, possession of definitive legal title is virtually an indispensable condition for access to term financing and official institutional support. An efficient titling system as frontier development proceeds thus is likely to have favorable repercussion on productivity growth and rural capital formation. Conversely, long delays in titling disrupt the settlement process and encourage land invasion and property speculation. Delays in resolving title questions also foster the predatory, short-term exploitation of land which can lead to soil exhaustion and erosion. The position of small farmers and squatters is the most prejudiced by such delays since these groups lack both access to the political decision-making process and resources to finance legal representation and court appearances in distant state capitals.

xxvii. INCRA's functions include land-titling as well as organization of colonies in areas within 150 km of international boundaries and 100 km of each side of federal highways situated in Amazonia Legal. Legislation gives priority to colonization on lands in these two categories. In addition, INCRA has sole responsibility for land-titling in the Federal Territory of Rondonia. The simultaneous construction of frontier penetration roads in many areas has attracted migratory flows and settlement activity that, by and large, have overwhelmed the executive capacity of the existing institutional structure. This assessment extends to delineation and titling activities of INCRA but also rural extension services, rural credit, minimum price policies, agricultural marketing, health, education, housing and other social services. Despite the broad consensus that titling activity has lagged markedly behind the process of land occupation, quantitative estimates of the work outstanding are difficult to obtain. In broad terms, the area remaining to be delineated by INCRA in the Central-West Region, including Rondonia, is 88.0 million ha. While the process is relatively advanced in the state of Goias, it is seriously delayed in Mato Grosso. Thus, in the period 1971-74, INCRA completed delineation work on only 671,000 ha whereas the area outstanding was some 47.0 million ha. The backlog of titling work in Rondonia is illustrated by the fact that only 6% of the total area of 24.3 million ha possesses definitive legal title. Major inroads into the backlog of delineation and title work will not be achieved without sweeping structural changes to remove institutional constraints and expedite the legal and technical processes involved. Rapid and simplified titling procedures are indispensable for the effective implementation of strategies of land use and settlement in frontier areas.
xxviii. To design and implement such procedures on the massive scale required to avert the kind of land conflicts which have typified the spontaneous development process to date would appear to require substantial upgrading of INCRA, including greater real budgetary allocations in the coming years. But additional financial resources alone will not guarantee that INCRA will obtain the skilled human resources necessary to develop an accelerated titling program and the complementary capacity to carry out farm management studies in each agro-economic region to set minimum and maximum parcel sizes and otherwise guide and support the development process. The strengthening of INCRA should be accompanied by the development of clear ground rules for access to credit which reward those who are willing to invest their own and their family’s labor in the process of agricultural development.

Some Final Considerations

xxix. The wide spectrum of settlement patterns raises complex issues for policy formulation. Most significantly, policy choices must be made in the context of rapid unorganized settlement which restricts the scope for maneuver. Current agricultural frontier development programs (POLAMAZONIA and POLOCENTRO) and complementary support activities (rural credit and extension) are now concentrated on the development of large-scale agricultural establishments, in the expectation that this will promote efficiency. The present pattern of land settlement, reinforced by ongoing government programs, is tending to reproduce the highly unequal distribution of land and rural incomes found in regions of earlier settlement.

xxx. The major question facing the Brazilian authorities is how to manage the process of frontier settlement to achieve a balance between efficiency and equity considerations. The answer to this question depends in large part on the target groups chosen as intended beneficiaries of public programs and the constraints on policy execution. For example, institutional factors, particularly shortages of technical and managerial personnel, constitute a major constraint on the formulation and implementation of a regular flow of directed colonization projects. Yet such projects would be more likely to assist the poorer segments of the rural population.

xxxi. However, even if institutional constraints do not permit a large scale directed settlement effort, there are other policy options which could support operations of small- and medium-size farms. This might involve rapid, simplified titling procedures and minimum infrastructure provision, possible on an "effective demand" basis, in areas of spontaneous pioneer settlement. This approach embodies elements from INCRA’s programs for projetos fundiarios and directed settlement but would place overriding emphasis on swift execution. Careful selection of public lands to be sold, whether by open auction or directly to private colonization companies, and control of sales criteria, such as parcel size and credit terms, would encourage land use along lines of agricultural comparative advantage. For example, land with soil characteristics and location which favor permanent settlement by small farmers and homesteaders could be reserved for this purpose. Conditions in other areas may make it advisable to foster large-scale farming or livestock operations. In short, although frontier agricultural development will involve various settlement approaches, the critical task is to design policy instruments and an institutional framework to promote land use patterns which yield the greatest social and economic benefits.
1. The Central-West Region of Brazil, conventionally defined as the states of Mato Grosso and Goias and the Federal District of Brasília, covers 1.9 million square km or 22% of the total area of the country. This area contains one of the world's last great agricultural frontiers. The rate of settlement of the region has been increasing over the past decade and the Government of Brazil is committed to accelerating the development of the region's agricultural sector over the next five years. The development of this vast area could play a major role in alleviating rural poverty in Brazil by accommodating migration from poor areas of the country. However, the Government appears to have opted for a strategy to maximize the rate at which new lands are brought into cultivation. One objective of this strategy is to achieve a rapid increase in the production of export crops which would alleviate the country's balance-of-payments situation. This raises the issue whether the Government's strategy is so strongly oriented to large-scale commercial enterprises that it does not assign an adequate role to smaller producers even when economy-of-scale considerations indicate that their operations could be efficient.

A. Physical Aspects and Geographical Resources

2. The vast territory of the Central-West Region of Brazil encompasses climatological zones ranging from semi-equatorial in the north to semitemperate in the south. Annual average temperature ranges from 26°C in the north to 22°C in the south. But temperature extremes range from 32°C-36°C in the summer in the north to 6°C-14°C in the winter months in the south of Mato Grosso. Rainfall is abundant over practically all the region, ranging from 2,000 mm in the northern part of Mato Grosso to about half that level in the southwestern part of that state. There is, however, a pronounced dry season in most of the region lasting from 4-6 months with the southern areas having the most evenly distributed rainfall pattern.

3. The major constraint on the agricultural development of the region appears to be soil quality. As a broad generalization, most of the soils are either of low natural fertility due to high acidity, or suffer from faulty drainage. Isolate microregions in the extreme south of Mato Grosso have high natural fertility with soils and climate similar to those of the interior of Sao Paulo and northern and western Parana. However, with modern technology and substantial soil preparation, land throughout the Central-West can be utilized successfully for crop production and fairly extensive livestock operations.
4. At the risk of some oversimplification, four major physiographic zones can be distinguished:

(a) Pre-Amazonian tropical forest;
(b) The Brazilian savannah or cerrado;
(c) Alluvial flood plain; and
(d) The grasslands (campo) of southern Mato Grosso.

Each of these zones embraces various subregions with transitional characteristics in terms of climate, soils and vegetation.

Pre-Amazonian Tropical Forest

5. This is an area of semihumid interior forest which covers extensive parts of northern Mato Grosso, northern Goias and most of the federal territory of Rondonia. These forested areas form a transitional zone between the equatorial climate and forests of the lower Amazon Basin and the tropical climate of the cerrados or savannahs of Central Brazil. The climate of this transitional zone is hot and humid, with average temperature ranging from 24°C to 30°C and a relative humidity exceeding 80%. Annual rainfall is over 2,000 mm but a distinct, though short, drier season occurs during the winter months.

6. The forest of this zone is relatively open, without the continuous canopy which distinguishes equatorial forest and this permits dense undergrowth to develop. Tree height varies from 10 to 30 meters depending on soil quality; indeed, this is used as a rule of thumb for determining agricultural potential in the areas where scientific soil tests are unavailable. Valuable hardwoods occur in these forests, such as mahogany, cedar, ipe and peroba, as well as Brazil nut species (bertholletia excelsa). Much of this pre-Amazonian area forms part of the vast central Brazilian crystalline plateau, long levelled by erosion, apart from mountainous watersheds. To the south, these watersheds are extensive flat tablelands, known as chapadas or chapadoes. The microclimates and vegetation of the chapadas resemble those of the cerrado.

7. Detailed soil surveys have yet to be undertaken in this zone, although the activities of the RADAM 1/ program and those of other federal agencies are rapidly improving the available data base. FAO-UNESCO soil maps indicate that most of the region is covered by light yellow clayey latosols which although having good physical qualities (they are deep, possess good water retention capacity and are resistant to erosion) are quite acid and, therefore of low fertility. 2/ However, wide belts of fertile dusky red latosols, including the famous terra roxa (red earth) soils, also occur in

1/ RADAM - Radar Amazonia, an extensive aerial natural resources survey of the Amazon Region.

2/ Ruy Miller Paiva et al, Brazil’s Agricultural Sector, Sao Paulo, 1973, p. 410.
this region. The latter soils contain volcanic material, are fairly neutral and often have medium to high natural fertility. One of these belts, approximately 200 km wide, appears to be located along the 10°S parallel from northern Mato Grosso into Rondonia, although its extent and soil characteristics are not yet known precisely. 1/ In general terms, however, despite the undoubted existence of soils with high natural fertility, the agricultural potential of this remote pre-Amazonian area remains to be determined.

The Savannah or "Cerrado"

8. The area of the Central Brazilian plateau (Planalto Central) known as cerrado extends over 50% of the Central-West Region, roughly 821,000 square km, encompassing two-thirds of Goias and one-third of Mato Grosso. The cerrado has a seasonal tropical climate, with a pronounced winter dry season of 4-6 months between April and September. Annual average rainfall varies from 1,000 to 2,000 mm and is concentrated between October and March. Mean monthly temperatures range from 18°C to 25°C.

9. The term cerrado includes types of vegetation known as cerradão, campo cerrado, campo sujo and campo limpo which describe gradations between the dense scrub and plentiful trees of the cerradão to the open grasslands and low, stunted brush of the campo limpo. The soils of the cerrado plateaus are generally sandy, infertile and heavily leached with a low capacity to retain moisture. Rainwater rapidly soaks through these soils but a hardpan of lateritic iron prevents further drainage and shallow lakes may even occur after heavy rain. As a result, "... only shallow-rooted plants able to withstand alternating waterlogging and drought and deep-rooted species able to draw upon the ground water (which usually occurs at a depth of 10 to 20 meters below the surface) are able to survive." 2/ Where there is some slope to give better drainage, less leaching and a higher ground water table, the cerrado found on the plateaus will give way to cerradão and, in the valleys, to forest.

10. In general, the soils of the cerrado have limited natural fertility due to their high acidity, low calcium content and the loss of their more soluble minerals through leaching. These characteristics indicate that permanent cultivation requires the application of soil correctives, principally lime and magnesium, and intensive use of fertilizers, such as phosphates,

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1/ Isolated agricultural settlement, including several large-scale undertakings, is beginning in this belt, notably in the município of Juruena in the vicinity of the Teles Pires, Taxidermista and Paranaita rivers.

nitrogen and sulphur. Several recent studies have examined these possibilities and the technologies needed to incorporate cerrado lands. The principal conclusion is that advanced techniques, involving mechanization and modern inputs (lime, fertilizers, improved seed varieties, etc.) would permit a significant extension of arable cultivation. 1/ Three soil types found in the cerrados are identified as having good agricultural potential with advanced techniques. In descending order of potential, these are dusky red, dark red and red-yellow latosols, which cover an area of 56,000, 333,000 and 110,000 square km respectively in Mato Grosso and Goias. The area of 56,000 square km of dusky red soils alone (latossolos roxas) represents almost one-fifth of that presently devoted to the 26 major crops in Brazil and the sum of the three is an area equivalent in size to the Argentine Pampas. The crops considered adapted to these soils using the technology recommended include upland rice, pineapple, soybeans, manioc and in areas with favorable climatic conditions, wheat, peanuts and corn. 2/ The results and analyses of these studies have considerably influenced recent policy measures in the cerrado region, such as POLOCENTRO and the PRODEGRAN programs for the Greater Dourados area.

Alluvial Flood Plain

11. The Central-West encompasses two major areas of alluvial flood plain, the Ilha do Bananal Region and the Pantanal. The Bananal, which forms part of the so-called Central Depression, is the flood plain of the Upper Araguaia and Mortes rivers and is situated in northeastern Mato Grosso and western Goias. 3/ The Bananal area is subject to annual floods and its soils are hydromorphic, 4/ generally acidic and low in calcium, magnesium and phosphorous. The vegetation is of a cerrado type and extensive cattle-grazing is the principal agricultural activity at present. However, the potential of the Bananal for irrigated rice production, given the requisite drainage works, is now being investigated. An experimental irrigation project on 20,000 ha will be undertaken at Xavantina, one of the priority areas selected for the POLOCENTRO program.

12. The Pantanal of southwestern Mato Grosso is part of the Paraguay Depression which includes the Gran Chaco Region of Bolivia and Paraguay.

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2/ Ibid, p. 149.

3/ The term "Bananal" is used as a shorthand expression for this region of flood plain. A similar formation occurs in the upper valley of the River Guapore in northwestern Mato Grosso but the area involved is much smaller.

4/ Developed in the presence of an excess of moisture which tends to suppress aerobic factors in soil-building.
In Mato Grosso, this immense flood plain of the Paraguay river basin and its major tributaries covers roughly 110,000 square km, extending between 500-700 km in a north-south direction and some 200-300 km from east to west. This region is bounded in the north by the Chapada dos Guimaraes and to the east and south by an escarpment rising to 400 to 500 meters. The extensive flat lands of the Pantanal are some 100 to 200 meters above sea level but over very wide areas, there is remarkably little variation in altitude and topography. Occasional isolated mountain ridges do occur, however, such as the Urucum Massif near Corumba.

13. The annual rainfall of 1,200-1,400 mm is heavily concentrated and much of the Pantanal suffers from a pronounced seasonal drought. The annual floods occur between December and May as the Paraguay and its tributaries break their banks and inundate extensive areas, possibly one-quarter of the Pantanal region. In these areas, only isolated hillocks and low ridges remain above the normal flood level and provide night refuge for cattle. The Pantanal thus includes lands subject to prolonged periods of alternating drought and inundated only when the floods are exceptionally heavy. These unique conditions, combined with soil differences, produce a complex in which both cerrado and forest (mata) types of vegetation are found, the so-called complexo do pantanal. 1/ However, for summary purposes, the Pantanal Region can be broadly characterized as grassland (Angola grass, capim mimosa, for example) dotted with clumps of trees. The trees become more numerous as the transition is made from the low Pantanal to areas beyond the normal flood level and these, in turn, give way to campo cerrado in areas completely flood free.

14. The Pantanal flood plain is formed by the accumulation of alluvial sediments and the soils are mainly hydromorphic, shallow and poorly drained. Somewhat more fertile clay soils occur in the low Pantanal areas due to more recent sedimentary deposits. The principal activity is cattle-raising, which is practiced on an extensive scale. The cattle reared in the region include a local breed (pantaneiro) descended from European stock imported during colonial times, azebuado crossbreeds, Nelore and other breeds. 2/ The reproduction and survival of cattle is controlled almost completely by natural or environmental factors. Primitive husbandry and the shortage of grazing land in the alternating periods of flood and drought reduce carrying capacities to roughly 0.2 head per hectare. In the dry season, land close

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2/ Some 70% of Pantanal cattle are crossbreeds of Gir, Nelore, Guzera and Indubrasil stock (azebuado), 15% have predominantly Nelore blood and 10% are pantaneiro stock. See Demostenes F. Silvestre Filho and Nilton Romeu, Caracteristicas e Potencialidades Do Pantanal Matogrossense, Serie Estudos Para o Planejamento No. 10, Brasilia, IPEA, 1974, p. 83.
to water becomes overgrazed and this problem recurs on the elevated areas during the floods. Direct livestock losses by drowning are sustained but exceptionally heavy floods may reduce the Pantanal herds by 10 to 15%, as in 1974. Nevertheless, the Pantanal constitutes a major cattle-raising region with an estimated herd in 1971 of 6.9 million head, approximately 6% of the national total. This vocation is likely to be reinforced by the gradual introduction of measures of flood control, water storage, pasture improvement and better animal husbandry. Greater control over the quality and area of pasture will raise carrying capacities and also stimulate local income expansion by encouraging fattening and meat processing activities within the Pantanal.

Southern Mato Grosso

15. This region, broadly defined as the area to the south of the 20° parallel, includes microregions of subtropical forest, cerrado and grasslands. Southern Mato Grosso has a high altitude subtropical climate with cool winters including occasional frosts and rainfall of 1,000-1,200 mm well distributed throughout the year. The area of grasslands lies to the south of Campo Grande and is open, gently rolling country with scattered shrubs and small thickets. In lower areas, the grasslands grade into campo limpo and campo sujo. Generally speaking, the soils of these open, undulating plains are of poor quality, porous and usually acidic. The application of soil correctives, particularly lime, and fertilizers again is required for permanent cultivation.

16. The most fertile soils in southern Mato Grosso occur in areas originally covered by subtropical forest. These forests are extensions of those once found in large parts of Sao Paulo and the south of Brazil. Their distribution in southern Mato Grosso is concentrated in the regions drained by tributaries of the Parana river, notably the Ivinheima, Vacaria, Brilhante, Dourados, Amambai and Iguatemi. These broad valleys and surrounding areas contain large deposits of rich dusky red latosols (rhodic ferrasols) and reddish brown lateritic soils (eutric nitosols), commonly designated as terra roxa and terra roxa estruturada. Patches of these soils are found in the microregion known as the Mata de Dourados and the towns which take their names from the rivers mentioned earlier. Rough estimates suggest that there are 1,000,000 ha of terra roxa and 4,000,000 ha of terra roxa estruturada in the Greater Dourados Region. These soils are of high to medium natural fertility with a pH of 5-7, well drained, good permeability and rich in bases. These characteristics make them very suitable for agriculture and much of the permanent small-farm settlement, in fact, has occurred on these soils, as in the case of Dourados. Nevertheless, extensive areas remain to be brought into cultivation and afford ample opportunities for relatively high density settlement based on such crops as rice, corn, soybeans, wheat and peanuts.

1/ Although not fully identified, these grasslands or campos de campanha appear to be closely related to the campanha gaucha or prairie steppe of Rio Grande do Sul. See R. M. Paiva et al, Brazil's Agricultural Sector, op. cit., p. 272.
A recent study of the Brazilian cerrados gives an overall but very preliminary indication of the agricultural potential of the Central-West Region. Of the approximately 1.9 million square km of land area, only 4.7% is considered to have "good aptitude" under "primitive" management. That is, soil conditions showing little or no limitation for sustained production of climatically adapted crops with no use of capital for maintenance and improvement of soil and only hand labor and animal traction for cultivation. This land is largely located in the southern part of Mato Grosso and is already fairly heavily settled. At the other extreme, 58.6% of the land is preliminarily classified as completely unsuited to agricultural production under "primitive" management. However, increasing the use of capital and modern technology would greatly add to the productive capacity of the region. For instance, under conditions of "developed" management, i.e., intensive use of capital and adoption of applicable research results and mechanization of all phases of operations, almost half of the land would be considered to have possibilities for sustained production of a large number of crops.
Table 1: AGRICULTURAL POTENTIAL BY LEVEL OF MANAGEMENT

(In percentages)

<table>
<thead>
<tr>
<th>Level of Management</th>
<th>Primitive /1</th>
<th>Semideveloped /2</th>
<th>Developed /3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good /4</td>
<td>4.7</td>
<td>2.6</td>
<td>6.7</td>
</tr>
<tr>
<td>Fair /5</td>
<td>1.6</td>
<td>27.9</td>
<td>39.1</td>
</tr>
<tr>
<td>Restricted /6</td>
<td>35.1</td>
<td>10.7</td>
<td>28.9</td>
</tr>
<tr>
<td>Inapt /7</td>
<td>58.6</td>
<td>58.7</td>
<td>25.4</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Techniques:

/1 Low level of knowledge, no use of capital for soil maintenance or crop improvement, hand labor and animal traction.

/2 Reasonable level of technical knowledge, some research results and capital used to maintain or improve soils, hand labor and animal traction and motor mechanization for transport of crops.

/3 High level of technology, extensive use of capital, intensive use of modern research results and mechanization in all phases of operation.

Soil Quality:

/4 Slight or no limitation for production of a large number of climatically adopted crops and good harvest (for about 20 years, with gradual decline under primitive management).

/5 Moderate limitations for production of a large number of climatically adopted crops. Good harvest in majority of years. Production can be maintained with developed techniques but will decline rapidly in 10 years under primitive techniques.

/6 Severe limitations for sustained production with primitive techniques. Fair harvests for first few years only.

/7 Sustained production not economically possible.

Source: IPEA, Aproveitamento Atual e Potencial dos Cerrados, op. cit.
B. The Regional Economy 1/

Population and Migration

18. The population of the Central-West was 5.2 million in 1970 according to the demographic census, representing 5.4% of Brazil's total population. Regional population grew at an average annual rate of 3.3% in the 1940s but has since accelerated sharply to 5.6% in the years 1950-70, significantly above the national growth rate of 3% for the same period. High rates of positive net migration induced by the opening up of new agricultural lands in Goias and Mato Grosso provide the main explanation of this rapid demographic expansion. Net migration in absolute terms has risen from roughly 90,000 during the 1940s to 391,000 in the 1950s and 718,000 in the 1960s. 2/ If taken in relation to the initial census years, 1950 and 1960, net migration during each of these decades represents 23% of the respective base population.

19. Migrants are defined in the census by reference to either previous place of residence or place of birth. Both criteria complicate the task of mapping and estimating migratory flows. Migration typically is a protracted, sequential process and can involve residence in several intermediate places before the location at the time of enumeration. 3/ Nevertheless, three major channels of migration to the Central-West can be distinguished. First, migration from the rural interior of the poor Northeast Region, via Maranhao, Piaui and Bahia, into northern and central Goias and then south towards Brasilia or west into Mato Grosso. The Belem-Brasilia highway has greatly facilitated this channel of access to the Central-West and employment generation associated with the construction and growth of Brasilia has strengthened this flow since the late 1950s. 4/ A second migratory flow, oriented towards southern Mato Grosso, originates in Parana and Sao Paulo. This flow is probably an extension of the large-scale migration to the Center-South

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1/ In view of the difficulty of disaggregating secondary data, this review follows Brazilian convention and defines the Central-West Region to include the states of Mato Grosso (MT) and Goias (GO) and the Federal District of Brasilia (DF), unless otherwise stated.

2/ Douglas H. Graham and Sergio Buarque de Holanda Filho, Migration, Regional and Urban Growth and Development in Brazil, mimeo., Instituto de Pesquisas Economicas, Universidade de Sao Paulo, 1971.

3/ Field surveys of settlers on public colonization projects in the Amazon and Central-West Regions indicate that, on average, these individuals spent 12 years in migration and had two intermediate periods of residence of several years before arrival in the colonization area. See Vania Corto Tavares et al: Colonizacao Dirigida no Brasil, (Rio de Janeiro, IPEA, 1972).

from the Northeast Region which has been the major characteristic of migratory patterns in Brazil since the last decades of the 19th century. \(^1\) This movement consists of northeastern families who migrated south to Rio and Sao Paulo, then moved on to Parana. Northern Parana constituted the principal agricultural frontier during the 1940s and 1950s based on the rapid expansion of labor intensive coffee cultivation, while the western areas of this state and southern Mato Grosso assumed this role in the 1960s. \(^2\) The census criteria tend to obscure this clockwise trajectory of migratory flows emanating from the Northeast and associated with the onward movement of the agricultural frontier through Sao Paulo and Parana.

20. The third major migratory current moves north and northwest from the poor, overpopulated areas of owner-operated family farms and *minifundia* in Rio Grande do Sul and Santa Caterina. Again, casual empiricism suggests that a substantial proportion of these population contingents settle en route in Parana before moving on towards Mato Grosso. Because of the decline in availability of new frontier land, the capacity of Parana to absorb migratory labor in significant numbers now appears to be diminishing, although the extreme western region of the state remains a major frontier area. \(^3\) Rapid in-migration has brought explosive population expansion to this region and each of its 19 constituent *municipios* has experienced population growth of 40% or more since 1970. This expansion affords an indication of the pressures likely to be released in Mato Grosso as the possibilities of frontier settlement in Parana recede.

21. Within the limitations imposed by the census criteria of migration, the composition of migratory flows to the Central-West by region of origin is illustrated in Table 2. The in-migration of 1.6 million represents 15% of accumulated migratory flows in Brazil in 1970. These interregional movements also can be disaggregated to indicate whether the migrant's previous residence before the census date was located in an urban or rural area. Although the previous residence criterion will lead to underestimation of

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\(^1\) Estimates for interregional migration based on special tabulations of the 1970 demographic census indicate that the Northeast Region was the place of birth of 39% of all life-time migrants in Brazil. The criterion of previous residence gives an estimate of 35%. See Milton da Mata, *Migracoes Internas do Brasil*, Rio de Janeiro, IPEA, 1973, especially Chapter 3. A broader historical perspective is given by Douglas H. Graham and Sergio Buarque de Holanda Filho, *op. cit*.


\(^3\) The declining availability of new frontier land in Parana and recent changes in the crop mix from labor intensive products such as coffee and cotton, to mechanized agriculture, notably soybeans, have resulted in falling rates of rural employment expansion. The severe frosts of 1975, which caused widespread damage to coffee trees have accentuated this situation.
migrants of rural origin, accumulated net rural-rural migration into the Central-West amounted to 567,000 in 1970. 1/ The magnitude of these intra-rural flows reveals the strong attraction of the agricultural frontier for rural population contingents in other regions.

22. The past two decades have witnessed a marked change in the proportion of the region's population living in urban areas, increasing from 24% in 1950 to 46% in 1970. The construction of Brasília and the subsequent transfer of federal government agencies have been major factors in this rapid urban population expansion, which reached an annual average rate of 9.5% in the 1950s and 9% in the 1960s. The population of the Federal District of Brasília has increased fivefold since 1960, rising from 142,000 to 763,000 in 1975 according to recent IBGE intercensal estimates. Other major cities in the Central-West, notably Goiania (381,000), Campo Grande (140,000), Anapolis (105,000) and Cuiabá (101,000) also have grown rapidly, though less spectacularly, in recent years. 2/ However, urban population data can give a misleading view of economic structure and population distribution as the census uses juridical definitions rather than economic criteria to classify population centers as urban or rural. The rapid urban expansion since 1950 tends to obscure the impressive growth of the rural population in the Central-West which averaged 4.1% in the 1950s and 3.2% in the 1960s. The corresponding growth rates at the national level are 1% and 0.7%.

23. As a vast frontier area in the process of settlement, it is hardly surprising to find that the average population density of the Central-West (2.5 inhabitants per square km) is less than a fourth of the national average of 11 inhabitants per square km. Nevertheless, population densities vary considerably within the Central-West and several areas of relatively marked concentration can be distinguished. In Goias, these areas include the "Mato Grosso de Goiás" Region, with a density of 29 inhabitants per square km, and four microregions to the south and southeast where densities fall in the range of 5-9 inhabitants per square km. 3/ These five microregions hold 63% of the total population of the state but account for only 23% of its area. In contrast, population densities of 1-4 inhabitants per square km characterize the agricultural frontier areas of western, central and northern

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1/ The reason for this underestimation is that many migrants previously engaged in rural activities first will move to urban centers and so be classified by the census criterion as urban migrants. The estimate of interregional rural-rural migration to the Central-West is taken from Milton da Mata, op. cit., p. 78.

2/ The figures in parentheses refer to the population of the municipal district of these cities in 1970.

3/ The "Mato Grosso de Goiás" Region includes the major cities of Goiania and Anapolis and several smaller but dynamic urban centers. The four microregions are Planalto Goiano, Meia Ponte, Sudeste Goiana and Vertente Goiana Do Paranaiba.
Table 2: ACCUMULATED INTERREGIONAL MIGRATORY FLOWS TO THE CENTRAL-WEST REGION IN 1970 ACCORDING TO DEMOGRAPHIC CENSUS CRITERIA

<table>
<thead>
<tr>
<th>Region of Origin</th>
<th>Place of Birth Migration</th>
<th>Previous Residence Migration</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>North /1</td>
<td>13,294</td>
<td>5,213</td>
<td>0.9</td>
<td>0.4</td>
</tr>
<tr>
<td>Northeast /2</td>
<td>678,620</td>
<td>448,619</td>
<td>41.8</td>
<td>34.3</td>
</tr>
<tr>
<td>Minas Gerais and Espirito Santo</td>
<td>579,742</td>
<td>447,759</td>
<td>35.7</td>
<td>34.3</td>
</tr>
<tr>
<td>Southeast /3</td>
<td>304,532</td>
<td>346,669</td>
<td>18.8</td>
<td>26.5</td>
</tr>
<tr>
<td>South /4</td>
<td>46,296</td>
<td>58,268</td>
<td>2.8</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>1,622,484</td>
<td>1,306,528</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

/1 The states of Amazonas and Para.
/2 The states of Maranhao, Piaui, Ceara, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, Sergipe and Bahia.
/3 The states of Rio de Janeiro, Guanabara and Sao Paulo.
/4 The states of Parana, Santa Catarina and Rio Grande do Sul.

Source: Milton da Mata, op. cit., Tables 3-6 and 3-10.
Goias. The average population density of the state of Mato Grosso is markedly lower at 1.3 inhabitants per square km and notably so in the northern micro-region. This immense frontier area which accounts for 51% of the total area of the state and 33% of the Central-West has a population density of 0.1 inhabitants per square km. The concentration of population in certain agricultural regions and several major urban centers thus accentuates the frontier character of extensive areas of the Central-West.

Economic Structure

24. The central importance of agricultural activities in regional net product is evident from Table 3, despite its decline in relative terms especially during the last decade. This decline is due to the significant expansion of the tertiary sector particularly in the years 1959-70. Within the tertiary sector, attention is drawn to the rising participation of government activities, which presumably reflects the growing importance of Brasilia. The sectoral distribution of the labor force confirms primary activities as the principal base of the regional economy (Table 3).

25. Regional net product expanded at an average annual rate of 10.5% in real terms during the years 1949-70 and the growth of real income per head in the Central-West has averaged 5%. In 1970, regional per capita income was US$314 per year of 65% of the national average. 1/

26. Industrial activity in the Central-West is limited and little diversified, as might be expected of a peripheral regional economy whose growth is largely dependent upon the rate at which its unexploited natural resources can be incorporated into the economic system. Industrial establishments typically are small and manufacturing output is heavily concentrated in food processing, nonmetallic minerals and wood products. These sectors accounted for 68% of gross value added and 66% of employment in manufacturing industry in 1970. 2/ The processing of livestock and agricultural products alone represented 46% of manufacturing value added. This sector will expand further as the settlement of new lands accelerates and creates investment opportunities for large-scale processing plants for livestock, cereals and vegetable oilseeds. 3/ In the immediate future, industrial diversification is likely to be based on the exploitation of

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1/ These estimates are based on revised national and regional income data published in 1974 by the Getulio Vargas Foundation. At present, revised regional income data are available only for 1949, 1959 and 1970. These data replace the annual series of regional and state income for the period 1947-68.

2/ Estimates from the 1970 industrial census.

3/ The decision by the Brazilian firm, SADIA, to build a modern meat-packing plant in Cuiaba is one example.
Table 3: SECTORAL DISTRIBUTION OF REGIONAL NET PRODUCT, 1949-70 AND THE LABOR FORCE IN 1970

(In percentages)

<table>
<thead>
<tr>
<th></th>
<th>Regional Net Product /1</th>
<th>Labor Force /2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Activities</td>
<td>56.8</td>
<td>53.0</td>
</tr>
<tr>
<td>Secondary Industry</td>
<td>7.0</td>
<td>7.3</td>
</tr>
<tr>
<td>Tertiary Activities</td>
<td>36.2</td>
<td>39.7</td>
</tr>
<tr>
<td>Commerce</td>
<td>10.2</td>
<td>14.0</td>
</tr>
<tr>
<td>Transport and Communications</td>
<td>5.7</td>
<td>5.1</td>
</tr>
<tr>
<td>Government</td>
<td>7.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Other Activities</td>
<td>13.2</td>
<td>13.9</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

/1 At factor cost.
/2 Economically active population aged 10 years and over.
/3 The labor force was 1,539.5 thousand in 1970.


Labor force - Censo Demografico de 1970, IBGE
timber resources, including several valuable hardwood species, and mineral reserves. 1/ Several projects are under consideration to mine and process nonferrous metals, notably nickel and copper, in the municipio of Niquelandia in Goias and to extend the exploitation of iron ore and manganese in the vicinity of Corumba, Mato Grosso. The utilization of limestone in agriculture also will increase as a result of special credit lines established by a new development program for the cerrado region.

C. The Agricultural Sector

Major Products

27. Agriculture is the mainspring of growth and employment in the Central-West Region. Economically, the Central-West is the frontier of the dynamic, industrialized Center-South Region with Sao Paulo at its hub which provides the principal market for its major cash crops. The major urban places of the Central-West, such as Goiania, Anapolis, Campo Grande and Cuiaba, function largely as collection and distribution centers. 2/ The main agricultural products which enter these inter-regional trade flows are rice, cotton, beef cattle and, in more recent years, soybeans, peanuts and wheat. In 1973, the Central-West accounted for 27% of Brazil's output of rice and 22% of beef cattle.

28. Beef cattle production in the Central-West, as elsewhere in Brazil, typically involves extensive methods on unimproved natural range. Cattle carrying capacities of natural pasture are low due to the marked dry season which affects much of the region. These climatic factors constrain animal growth and result in a relatively high average age at slaughter. Extensive practices of herd management and nutritional deficiencies also produce widespread incidence of disease (brucellosis, anthrax, foot and mouth and rabies) which is reflected in high mortality rates and low birth rates. In international terms, productivity in the livestock sector in Brazil is low as shown by slaughter herd ratios. Conditions in the Central-West are aggravated by the rudimentary infrastructure of many cattle-raising areas, particularly transport facilities. Heavy weight losses are sustained in the cattle drives to

1/ The areas of Mato Grosso north of parallel 16 and those north of parallel 13 in Goias are included in Amazonia Legal and eligible for SUDAM investment incentives. However, by December 1973, the two states had only 29 projects which accounted for 10% of approved total industrial investment under the scheme.

2/ See, for example, IBGE: Divisao do Brasil em Regioes Funcionais Urbanas (Rio de Janeiro, 1972). Also, Martin T. Katzman, op. cit., where it estimated that the state of Sao Paulo absorbed 60-65% of Goias' exports by value and furnished 80% of its imports in the 1960s.
distant railheads or long trucking distances. 1/ Unfortunately, representative data on beef cattle production which take account of the diverse natural conditions found in this vast region are difficult to obtain.

Incorporation of New Agricultural Lands

29. Even during the 1960s, the Central-West area was making a significant contribution to Brazil's agricultural growth. While Brazil's land in farms increased by 17% from 1960 to 1970, the Central-West Region's area in farms was growing twice as fast, by 35%. Almost 50% of new land incorporated into farms during this decade was in the Central-West, as was 19% of the new land in crops. The cattle population of the Central-West Region is estimated to have grown by 64% between 1960 and 1970 compared with about 40% for Brazil. Finally, while agricultural employment was growing at 1.5% for Brazil as a whole, it rose by 3.8% for the region. Thus, 10.5% of new agricultural employment during the 1960s was in the Central-West Region.

30. The rapid growth of the area has continued and probably accelerated in the 1970s. As measured by area devoted to the 20 principal crops, land in crops increased by 41% during 1968-73, or just over 7% per year. Increased production of rice and cotton were the major factors in this expansion but the most dynamic crop has been soybeans, planting of which rose from less than 5,000 ha in 1968 to 146,000 by 1973. Despite the dramatic growth of soybean output, rice is easily the most important crop in terms of the value of production, followed in 1973 in descending order of importance by cotton, beans, manioc and soybeans.

31. The importance of the expansion of land in farms in the Central-West can be inferred from the fact that agricultural expansion in Brazil has been sustained by extending the area under cultivation rather than by raising productivity. If agricultural yields are assumed constant, with a tendency to decline in long settled areas, then the incorporation of new crop land in the Central-West represents an important mechanism for maintaining agricultural output growth. 2/ Furthermore, since the land in crops represents only 1.3% of the total area of the Central-West, the Region's role in meeting domestic market requirements and export demand undoubtedly will become increasingly significant. In 1970, the Central-West accounted for only 5% of Brazil's farm establishments but over 27% of the land in farms (and 7% of the land devoted to crops). Reflecting the recent nature of settlement and soil conditions, the average farm size in the region is 240 ha (about four times the national average). The 1970 agricultural census indicated clearly the extent to which the region is dominated by large farm establishments and the relatively

1/ The Central-West primarily is an area of reproduction and a substantial proportion of its cattle are shipped to other areas for fattening before slaughter.

2/ The spatial or geographical shift of production centers of major agricultural products is a major dynamic characteristic of Brazilian agriculture. In effect, with extensive growth, new lands with unexploited natural fertility counteract soil depletion and declining yields in
insignificant role played by very small farms. About 4% of the farms were over 1,000 ha in size and these accounted for 68% of farmland. For Brazil as a whole, less than 1% of the farms were of this size and they controlled 37% of the country's farmland. At the other extreme, 25% of the region's farms were of less than 10 ha while somewhat over half of the nation's total were of this size. The smallest farms accounted for less than 0.5% of the region's area in farms.

Table 4: SOME MEASURES OF EXPANSION OF THE AGRICULTURAL FRONTIER

<table>
<thead>
<tr>
<th></th>
<th>Absolute Figures</th>
<th>Incremental Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area in Farms ('000 ha)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(% Brazil)</td>
<td>53,605</td>
<td>59,987</td>
</tr>
<tr>
<td></td>
<td>(23.1)</td>
<td>(24.0)</td>
</tr>
<tr>
<td><strong>Number of Establishments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(% Brazil)</td>
<td>79,751</td>
<td>159,392</td>
</tr>
<tr>
<td></td>
<td>(6.3)</td>
<td>(6.9)</td>
</tr>
<tr>
<td><strong>Area in Crops ('000 ha)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(% Brazil)</td>
<td>608.3</td>
<td>1,365.9</td>
</tr>
<tr>
<td></td>
<td>(3.2)</td>
<td>(4.8)</td>
</tr>
<tr>
<td><strong>Agricultural Labor Force ('000)</strong></td>
<td>l/ 385.6</td>
<td>688.4</td>
</tr>
<tr>
<td>(% Brazil)</td>
<td>(3.5)</td>
<td>(4.4)</td>
</tr>
</tbody>
</table>

/1 Agricultural census data.

Source: Agricultural census, various years, FIBGE.

32. Small farm establishments under 10 ha constituted 36% of the regional increase in farm units during the same period. This growth in the number of small farms was concentrated overwhelmingly in Mato Grosso. On the other hand, farms under 10 ha accounted for only 0.7% of the increase in the area in farms which occurred in the period 1960-70. However, this negligible participation disguises the fact that 11% of the growth of new cropland occurred on such units. /1/
Agrarian Structure

33. This highly concentrated pattern of land ownership implies similar concentration in the distribution of rural income and wealth. The institutional framework in Brazil is such that large landowners enjoy easier access to inputs, capital and (subsidized) credit markets, as well as modern inputs (including subsidized fertilizers) and specialized technical personnel. As a result, large landowners are in a stronger position to benefit from technical innovations and official programs which raise the return on agricultural land. This, in turn, encourages asset and wealth accumulation in the form of land and thus can promote the further concentration of land ownership.

34. The unequal distribution of land ownership is illustrated from a different perspective in Table 6, which is based on the 1972 INCRA survey of rural properties. The properties are classified by reference to the "rural module" which gives the acreage required in different regions to provide a subsistence income for a farm family with a labor force equivalent to four adults. Rural properties are divided into four categories:

(a) minifundio - a property with an area below the module established for a given area;

(b) empresa rural - a property which utilizes 50% of its cultivable land and does not exceed 600 times the area of the module;

(c) latifundio by use - a property with an area over 600 times the size of the module but which is uncultivated or inadequately exploited; and

(d) latifundio by size - a property with an area over 600 times that of the family farm module.

These data reveal the marked share of minifundio properties, which constitute 46% of all rural properties in the Central-West. Furthermore, one property may contain various farm establishments as the result of tenancy arrangements. On the other hand, 83% of the area is held in properties classified as latifundios by use, i.e., underutilized. The unequal distribution of land ownership is therefore associated with inefficient patterns of land use. The latifundio-minifundio dichotomy used to characterize agrarian structure in long settled regions, such as the Northeast, clearly is beginning to characterize ownership and land use patterns on the agricultural frontier of the Central-West.
Table 5: DISTRIBUTION OF AGRICULTURAL ESTABLISHMENTS 
BY SIZE, 1950-70

<table>
<thead>
<tr>
<th>Size Class</th>
<th>No. of Establishments (%)</th>
<th>Area in Farms (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10 ha</td>
<td>11.3</td>
<td>18.6</td>
</tr>
<tr>
<td>10 - 100</td>
<td>39.0</td>
<td>46.7</td>
</tr>
<tr>
<td>100 - 1,000</td>
<td>38.3</td>
<td>28.0</td>
</tr>
<tr>
<td>1,000 - 10,000</td>
<td>10.5</td>
<td>6.1</td>
</tr>
<tr>
<td>10,000 or more</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Total /1</td>
<td>79,746</td>
<td>159,382</td>
</tr>
</tbody>
</table>

/1 The area in farms is given in 1,000 ha. Total may not sum to 100 due to rounding.

Source: Agricultural census, various years, FIBGE.

35. Finally, data on the major tenure groups indicate the preponderance of owner-operators, both in numerical terms and by land holdings (Table 7). Tenant farmers are important numerically but control only 3% of the area in farms. Squatters are defined for agricultural census purposes as individuals cultivating public lands and private property, with or without the owner's consent who pay nothing for its use. The problems associated with squatters and other groups of untitled occupants of land are discussed at length in subsequent sections of this report.

36. Estimates of regional income distribution in 1970 give a Gini-coefficient of 0.49 for the Central-West, well below the Gini-coefficient of 0.57 for Brazil as a whole. /1/ Nevertheless, regional income is heavily concentrated and the share of the lowest 40% of the population in income is only 14%. If absolute poverty is defined by reference to an income per head of one-third the national average, then approximately 30% of the Central-West's population would be included. (This proportion is reduced to 20% for the

urban population.) On the other hand, the urban income distribution is more concentrated with a Gini-coefficient of 0.53 as compared with 0.36 in the rural sector. In short, the rural sector exhibits a more equitable distribution but income is distributed about a lower mean. 1/

<table>
<thead>
<tr>
<th>Type of Property</th>
<th>Number of Properties</th>
<th>% Distribution</th>
<th>Area ('000 ha)</th>
<th>% Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minifundio</td>
<td>98,748</td>
<td>45.9</td>
<td>4,230</td>
<td>3.2</td>
</tr>
<tr>
<td>Empresa Rural</td>
<td>12,330</td>
<td>5.7</td>
<td>8,971</td>
<td>6.7</td>
</tr>
<tr>
<td>Latifundio by Use</td>
<td>104,116</td>
<td>48.4</td>
<td>110,470</td>
<td>82.6</td>
</tr>
<tr>
<td>Latifundio by Size</td>
<td>75</td>
<td>-</td>
<td>10,115</td>
<td>7.5</td>
</tr>
<tr>
<td>Total</td>
<td>215,319</td>
<td>100.0</td>
<td>133,786</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Estatisticas Cadastrais, Vol. I: Recadastramento de 1972, INCRA.

1/ This phenomenon also is observed at the aggregate level in Brazil where the Gini-coefficients for the urban and rural sectors in 1970 were 0.55 and 0.44. See Langoni, _op. cit._, p. 81.
Table 7: DISTRIBUTION OF ESTABLISHMENTS AND AREA IN FARMS BY MAJOR TENURE GROUPS, 1970

<table>
<thead>
<tr>
<th></th>
<th>Number of Establishments</th>
<th>% Distribution</th>
<th>Area ('000 ha)</th>
<th>% Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner-Operators</td>
<td>165,274</td>
<td>65.3</td>
<td>72,150</td>
<td>89.0</td>
</tr>
<tr>
<td>Tenants</td>
<td>29,395</td>
<td>11.6</td>
<td>2,078</td>
<td>2.6</td>
</tr>
<tr>
<td>Sharecroppers</td>
<td>9,110</td>
<td>3.6</td>
<td>313</td>
<td>0.4</td>
</tr>
<tr>
<td>Squatters</td>
<td>49,427</td>
<td>19.5</td>
<td>6,476</td>
<td>8.0</td>
</tr>
<tr>
<td>Total</td>
<td>253,206</td>
<td>100.0</td>
<td>81,017</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: 1970 Agricultural census, FIBGE.
II. FEDERAL ECONOMIC POLICY IN THE CENTRAL-WEST REGION

A. The Period 1950-74

37. The settlement and development of the Central-West, the so-called Marcha para o oeste (march to the west), has long stirred the Brazilian imagination, but government action to realize these aims was sporadic before 1970. Despite this discontinuity, however, the cumulative effects of several federal initiatives have given marked impetus to the economic growth of the Central-West Region. These initiatives include the construction of Brasilia, the new national capital, and the Belem-Brasilia highway, which links the agricultural frontier zones in the northern and central areas of Goias with the relatively well developed Goiania-Anapolis Region and thence with major consumer centers, during the Kubitschek administration in the later 1950s. Both programs sought to focus national attention and developmental aspirations on the unexploited economic potential of the vast sparsely-settled interior. Both projects have been "successful" insofar as they have stimulated high rates of net migration to the Planalto Central or Central Plateau since the 1950s and facilitated its integration with the Central-South of Brazil. The spatial diffusion or "interiorization" of economic development has since become the principal theme of regional development policy in Brazil. The antecedents of the current National Integration Program (PIN) are to be found in the Kubitschek measures of the late 1950s.

38. Subsequent key federal measures for the development of the region include the creation of the Central-West Development Commission in June 1961. This Commission, which held advisory and executive powers for regional development planning, was succeeded in 1967 by the Superintendency for the Development of the Central-West (SUDECO). This agency, which is responsible to the Ministry of the Interior, also combines regional development planning and executive functions. Its area of jurisdiction comprises the states of Goias and Mato Grosso and the Federal Territory of Rondonia. This area overlaps in part with that of the Superintendency for the Development of the Amazon Region (SUDAM) which was established in October 1966 and covers an area extending south to the 16th parallel in Mato Grosso and the 13th parallel in Goias and also embraces the Territory of Rondonia. For constitutional purposes, these areas are considered part of the Amazon Region or Amazonia Legal, and thus projects located in these areas are eligible for fiscal incentives administered by SUDAM (similar to the 34/18 tax credit scheme applied in the Northeast Region of Brazil). This program extends subsidized equity and loan financing to projects approved by SUDAM in the agricultural, ranching, industrial and public utility sectors. The areas in Mato Grosso and Goias eligible for tax credit funds attracted 3.4% of total investment in projects approved under SUDAM by December 1973 and 71.4% of the agricultural and livestock projects. In these sectors, Mato Grosso alone accounted for 65.4% of approved investments.
The National Integration Program (PIN)

39. The calamitous drought of 1970 in the Brazilian Northeast evoked a radical revision of the country's regional development policy. Until then, policy instruments and programs had been applied to the development problems of each region taken in isolation. The National Integration Program (PIN), introduced in June 1970, attempted a new approach which emphasized regional complementarity. In broad terms, the PIN strategy seeks to attenuate development problems in the heavily populated Northeast by accelerating the settlement and economic expansion of the North and Central-West Regions. A central aim is to reallocate manpower currently absorbed in low productivity activities in the Northeast to exploit the underutilized natural resources of the North and West.

40. During the first phase of the PIN strategy, which roughly coincided with the First National Development Plan of 1972-74, the Amazon Region was the principal recipient of investment resources. Emphasis was placed on the construction of penetration roads, notably the Trans-Amazon Highway (BR-230) and the establishment of colonization projects along their routes. Other important first phase PIN roads included the Porto Velho-Manaus (BR-319) and the Cuiaba-Santarem (BR-165). Judging by the proposed PIN financial program, it appears that about half of the Cr$3.6 billion (in 1974 prices) expenditure under the program was devoted to transport infrastructure.

41. The PIN strategy subsequently was reinforced by the Land Redistribution Program (PROTERRA - Programa de Redistribuicao de Terras e de Estimulo a Agro-Industria do Norte e Nordeste), introduced in July 1971 with total resources of Cr$4 billion at 1971 prices. The direct impact of PROTERRA on the Central-West is restricted to those areas under SUDAM jurisdiction and hence eligible for access to the special rural credit programs. Despite the explicit aim "to promote easier access to land," the legislative powers of PROTERRA to expropriate and redistribute land have not been applied vigorously. In practice, the redistributive component has been allowed to atrophy and PROTERRA resources have been absorbed in infrastructure projects, particularly road construction, and special credit lines to stimulate agricultural and agroindustrial production. This orientation has continued under the present Geisel administration and PROTERRA virtually is confined to financing directly productive activities in the rural sector.

42. The Central-West's designation as a program region was confirmed with the introduction of the Central-West Development Program (PRODOESTE - Programa de Desenvolvimento do Centro-Oeste) in November 1971. This program was restricted to those areas of Mato Grosso and Goias excluded from the SUDAM region. PRODOESTE initially was assigned Cr$650 million for fiscal years 1972-74.

43. PRODOESTE resources were allocated to the construction of a basic road network (Cr$460 million), rural feeder roads (Cr$50 million) warehouses, silos, crop-processing and meat-packing plants (Cr$90 million) and flood
control works (Cr$50 million). PRODOESTE thus followed firmly along the lines of other "integration programs" in its emphasis on roads and rural infrastructure. However, in this case, there is no reason to suggest that this emphasis was misplaced since economic motives rather than geopolitical aims (as in the case of the Amazon) were preeminent. The Central-West lacked even a rudimentary network of all-weather roads linking production areas with transshipment centers and commercial entrepots. The road construction and paving projects undertaken during the Medici administration represented a major step towards the transformation of this situation.

44. The program provided for construction of roads linking Cuiaba and the southern cities of Campo Grande and Dourados which are of major strategic importance as they constitute the north-south backbone of the region's road network. Similarly, an east-west axis road in central Mato Grosso has been built. Construction and improvement of the basic truck road network was complemented by a rural feeder road program. The latter was administered by the National Development Bank (BNDE) which established a special credit line for the state highway departments undertaking feeder road construction. The main quantitative accomplishments of PRODOESTE can be reviewed briefly. The trunk road program involved the construction of 1,605 km, of which 1,090 km were paved. Six hundred ninety-one km of feeder roads were built, with 315 km in Goias and 376 km in Mato Grosso. Thirteen warehouses, each with a storage capacity of 3,600 tons, were completed under the CIBRAZEM program. Urban flood control projects were undertaken in Campo Grande, Goiania and Anapolis. Projects involving the construction of rural wells and drainage canals also were undertaken in the period 1972-74.

B. Regional Policy in the Central-West Since 1975

45. Although the PIN and PROTERRA programs have been extended until 1979, a new array of regional development programs has been introduced by the Geisel administration since 1974. The new measures generally continue the regional policy initiated in 1970 and retain the focus on agriculture and agro-industry. The main Federal Government programs instituted in 1974-75 for the Central-West are the following:

(a) the Program of Agricultural and Agro-Mineral Poles of the Amazon (POLAMAZONIA);

(b) the Savannah (Cerrados) Development Program (POLOCENTRO);

(c) the Special Program for the Geo-Economic Region of Brasilia;

(d) the Special Development Program of the Pantanal (PRODEPAN); and

(e) the Special Development Program for the Greater Dourados Region (PRODEGRAN).
While the current set of regional policies exhibits certain features which characterized their predecessors, notably the weight given to rural infrastructure and special rural credit lines, they are distinguished by their greater selectivity in the choice of target areas and greater adaptation of each program to the characteristics of these target areas. In spatial terms, expenditure allocations will be concentrated in areas which present comparative advantages for rural development and natural resource exploitation. The new programs derive from the "growth pole" concept but this approach has not been translated into detailed operational guidelines. Government officials also refer to the new measures as "integrated development" programs in order to stress the multisectoral nature of the component projects and the need to coordinate a variety of executive agencies.

The principal objective of these programs is to open up isolated regions in the North and Central-West for settlement and so extend the area under cultivation. The emphasis on short-run output expansion and the measure adopted to achieve this goal impart a strong efficiency- or production-orientation to the new strategy. In the case of POLAZONIA, however, the importance of generating output growth assumes a longer-term perspective, although production objectives are stated explicitly in the II PND. Thus, "...the moment has arrived to take advantage of the potential that Amazonia represents, principally because of the significant contribution it will make towards increasing Gross National Product." 1/

An efficiency-orientation also is reflected in the central role assigned to the commercially organized farm establishment, empresa agricola, in the settlement of areas incorporated in the POLAZONIA and POLOCENTRO programs. It means that the direct beneficiaries or rural credit and public overhead capital formation would tend to be concentrated in the upper quintile of the rural income distribution. The bottom two quintiles of this distribution would benefit indirectly, mainly via the permanent employment opportunities generated by this type of settlement. In other words, the land-occupation model advanced by POLAZONIA and POLOCENTRO would tend to reproduce the latifundio-minifundio complex of farm ownership and the income distribution associated with concentrated land ownership.

The Government has been concerned about the ecological dangers of primitive, shifting agricultural practices in the pre-Amazon and cerrado areas of the Central-West and this, to some extent, explains the concentration on the empresa agricola. In this respect, POLOCENTRO represents a major policy innovation since it seeks explicitly to ensure that appropriate agricultural techniques are utilized in bringing frontier lands into cultivation. Direct beneficiaries of the program's special highly subsidized credit lines are required to adopt techniques and farming practices, including mechanization, which maintain fertility and prevent soil erosion. These include the application of lime and fertilizers and contour plowing. In the Brazilian context, therefore, POLOCENTRO is a novel program as it is a serious attempt to arrest frontier occupation based on itinerant patterns of cultivation in favor of permanent settlement.

50. However, access to the appropriate technologies, including the equipment needed to prepare land for their application, requires substantial capital resources, technical expertise and managerial capacity. In general terms, credit availability is a prerequisite, given the substantial capital costs of the technological package considered appropriate. Credit access, in turn, presupposes undisputed legal title to land, given the real collateral requirements imposed by the commercial banks engaged in medium- and long-term rural financing. Application of the recommended technology thus is linked inextricably with land ownership as this remains the sine qua non of rural investment financing under present institutional arrangements.

51. The current development strategy in the Central-West accepts this position as its starting point and so relies for execution on the activities of the commercial, profit-seeking empresa agricola. This approach calls for relatively few institutional changes and rapid implementation is assured given a ready supply of eligible private borrowers. These pragmatic considerations are reinforced by the weight attached to short-run output expansion, notably in the case of POLOCENTRO, which again favors policy measures oriented towards relatively large commercial farm enterprises.

52. These general comments on POLAMAZONIA and POLOCENTRO suggest that current development strategy in the Central-West is based on the provision of investment incentives, subsidized credit and rural infrastructure to encourage large-scale commercial agriculture. However, this model is restricted to selected areas. In spatial terms, POLAMAZONIA and POLOCENTRO do not offer a global settlement strategy rather, they seek to influence land settlement and agricultural development in well-defined areas. Furthermore, other patterns of frontier occupation have emerged as the result of rapid in-migration and spontaneous forms of settlement. These alternative settlement patterns, which pose other problems and require different policy responses, are considered below.

C. Program of Agricultural and Agro-Mineral Poles of the Amazon (POLAMAZONIA)

53. This program, which received formal approval in September 1974, formulates official settlement policy for the Amazon Region in the period 1975-79. The general approach can be characterized as one of selective occupation of areas with the most fertile soils as identified by recent studies, including aerial photographic surveys undertaken by the RADAM project. A major element in the rationale for promoting the settlement of these priority areas is the expectation that they possess comparative advantages for permanent settlement and thus will be able to contribute significantly to future agricultural output growth.

1/ The PND II for 1975-79 includes several other programs to develop the Amazon Region which involve large-scale mining projects, transport and power investment, urban infrastructure projects and timber production. Examination of these programs is beyond the scope of the present report.
POLAMAZONIA also is intended to influence the direction of migratory flows entering the Amazon Region and achieve a more rational and economically productive pattern of settlement. The areas selected under the program are viewed as "development poles" which will attract migrant labor. Although the PIN projects executed under the PND I in the years 1970-74 provided penetration roads and essential infrastructure, government officials now consider that the development problems caused by spontaneous in-migration and occupation previously were underestimated. The Government is also coming to realize that the social and administrative problems of its overly organized, directed colonization schemes also requires the formulation of new approaches to settlement policy.

The POLAMAZONIA program identifies 15 areas in Amazonia Legal where occupation and integrated development will be promoted. Although the categories overlap in certain cases, the areas selected are designated as mining, cattle-ranching or agro-industrial growth poles. Program objectives are stated in qualitative terms, although one aim is to raise the cattle numbers in the Amazon Region to 5,000,000 head by 1980. In the case of agriculture, POLAMAZONIA seeks to expand the production of permanent or long-cycle crops, such as rubber, cocoa, sugar, dende palm, tropical fruits, pepper and rice.

Terms and Implementation

POLAMAZONIA projects will involve federal investment expenditure (excluding loan financing) of Cr$4 billion in the period 1975-79. Projected expenditure for the years 1975-77 is Cr$2.5 billion. The program, which is coordinated by a special group of ministerial representatives, will be financed primarily by transfers from PIN, PROTERRA and the federal budget. Although several ministries are involved in project implementation, the Ministry of the Interior will assume the central role, principally through SUDAM, SUDECO and the Bank of Amazonia (BASA - Banco de Amazonia, S.A.).

Four of the 15 priority areas chosen for inclusion in POLAMAZONIA are located in the Central-West. These are Aripuana and Juruena in northwest Mato Grosso, Xingu-Araguaia in northeastern Mato Grosso and Araguaia-Tocantins in northern Goias. In each program area, the execution of POLAMAZONIA policies will be based on the priorities and resource allocation established by an Integrated Development Plan. These plans will specify public investment programs and will be oriented "... principally to facilitate the implementation of productive activities by the private sector" (Article 5, Decree No. 74,607, September 1974). The Integrated Development Plan also will ensure an "... adequate zoning of natural resource use ..." and designate forestry and nature reserves, national parks and Indian reservations.

The legislation and the ministerial statement supporting the creation of POLAMAZONIA both fail to provide a clear indication of the settlement patterns that it hopes to encourage. They state that "the strategy unites programs for settlers (colonos) and small farmers with those to be implemented by agricultural enterprises -- small, medium and large -- as well as private colonization companies." They do not specify the weight that will be given to these types of settlement.
59. The need for elaboration of Integrated Development Plans for each program area for 1975-77 has delayed the disbursement of funds under POLAMAZONIA. This preparation phase extended from October 1974 to April 1975. These plans and their constituent projects then were reviewed by the special coordinating group for submission to the Economic Development Council (CDE). The approval of the financial program for fiscal year 1975 by the CDE in July 1975 marks the start of the operational phase of POLAMAZONIA. The 1975 financial program included 250 projects in the 15 priority areas which would absorb Cr$960 million (Cr$700 million are earmarked POLAMAZONIA resources).

60. The current set of POLAMAZONIA programs will involve a wide range of federal ministries and executive agencies as well as state government agencies and agreements with private corporations. The diversity of implementing institutions will impose new and heavy demands on the programming and coordinating capacity of the Federal Government. This complexity is suggested by the sectoral coverage of component projects. The major sectors are agriculture, transport, mining, urban development, power secondary and tertiary activities, education, health and science and technology. These sectors, in turn, embrace a variety of subprograms. The number of joint and multisectoral projects makes it difficult to obtain a precise sectoral breakdown of proposed 1975 expenditures. Infrastructure investment projects absorb the lion's share of 1975 expenditures, accounting for 70% of the total, although the substantial participation of urban development programs is worthy of note. These programs comprise urban water supply, drainage and sewerage systems, street lighting, urban transport improvements and flood control. In agriculture, attention is drawn to the expenditure absorbed in INCRA land-titling projects which will be undertaken in nine priority areas. Delays in resolving land title disputes can seriously distort settlement patterns and inhibit rural development.

Policy Issues

61. The POLAMAZONIA program raises several important issues. A major question is whether the Government should initiate settlement in such vast, isolated virtually unpopulated wilderness areas as Aripuana and Juruena in northwest Mato Grosso, 1/ which are in the public domain. Spontaneous settlement would proceed very slowly in these regions in the absence of federal state penetration roads and other indirect forms of encouragement of private enterprise. 2/ Migratory flows from the Northeast and Center-South Regions would instead continue to be directed along existing roads

1/ Aripuana has an area of 140,000 square km and only 2,000 inhabitants. The program area of Juruena comprises 85,000 square km and has 2,500 inhabitants.

2/ The main direct subsidy of private interests involves the sale of public lands (terras devolutas) at a purely nominal price (preco simbolico). This is alleged to have occurred in the sale of 2,000,000 hectares in Aripuana by the state government of Mato Grosso.
towards the sparsely populated areas of Goias, central Mato Grosso and Rondonia, where absorptive capacity significantly exceeds the probable magnitude of rural in-migration, especially if settlement policies to establish family size farms and colonization projects were to be put into practice.

62. The case for initiating the occupation of Aripuana and Juruena purely on short-run efficiency grounds appears weak since greater output response might be achieved by concentrating policy stimuli and infrastructure expenditures in areas where settlement is further advanced. These areas in central and eastern Mato Grosso and Goias also are more accessible to markets and likely to enjoy comparative advantages on this count alone. The case for opening up Aripuana and Juruena thus rests on the advantages to be derived from pursuing a "pre-emptive" strategy, notably careful selection of settlement areas, farm size distribution, product mix and other settlement characteristics. In evaluating these advantages, it is necessary to bear in mind the technical and administrative capacities of state and federal implementing agencies. The attractiveness of a pre-emptive strategy is seriously diminished if the outcome in practice is to accelerate haphazard spontaneous settlement due to the administrative shortcomings of development institutions.

63. Ecological arguments strengthen the case for undertaking controlled and carefully supervised occupation of Aripuana and Juruena. POLAMAZONIA does include environmental and agricultural research programs which will extend the work of several recent projects, such as Projeto Aripuana and Projeto RADAM. The creation of nature reserves and Indian reservations also is envisaged in the land use zoning proposed by POLAMAZONIA. Nevertheless, the present state of knowledge of the ecosystems in the Aripuana-Juruena Region is rudimentary and scientific and technological research of all types including, for example, detailed soil and forestry surveys, remain to be undertaken. Controlled implementation of settlement programs also will permit the more detailed formulation of measures required to protect the indigenous peoples found in these areas.

64. The settlement policy formulated in POLAMAZONIA starts from a general attempt to establish priorities in land use in each program area. These priorities include the creation of nature and forestry reserves and Indian reservations as well as the identification of areas with economic potential by virtue of their natural resource endowment. Despite this laudable effort to impose more rational land use patterns, POLAMAZONIA does not indicate how zoning will be enforced once occupation is underway. Recent experience of spontaneous settlement and land invasions suggest that the limits of nature reserves and tribal lands would quickly be overrun in the absence of policing. Land use planning must be supported by practical measures involving financial and administrative resources if it is to be effective.

1/ In the case of Aripuana, there is some evidence that the Government has modified its earlier settlement strategy. Planned financial allocations for road construction in 1976 are below the 1975 level in absolute terms, implying a significant reduction in real terms.
65. Insofar as short-run output expansion receives emphasis it would tend to introduce a bias in POLAMAZONIA settlement policy in favor of large scale commercial enterprises. Such undertakings can more easily mobilize the resources required to incorporate new lands rapidly. Large enterprises also have greater capacity to overcome production-related problems arising from transportation difficulties and the absence of warehousing and local credit and extension services. Conversely, in distant agricultural frontier areas, where rural infrastructure and services are weak or nonexistent, capital-poor small farmers are likely to engage in subsistence and extractive activities. In short, if the immediate policy aim is to increase the net agricultural surplus 1/, it will strengthen support for measures which promote large-scale operations.

66. As previously noted, there is no concise formulation of how private and public colonization projects and small-farm programs fit into the POLAMAZONIA settlement model, which raises questions about distribution of productivity gains and benefits under the POLAMAZONIA program. 2/ Certainly, where implementation involves a pre-emptive strategy of occupation, it would be possible ceteris paribus to select settlement models which provide small farmers with greater access to these benefits. Such objectives should be incorporated explicitly into the new program.

D. Savannah (Cerrados) Development Program (POLOCENTRO)

General Objectives

67. The rapid expansion of crop and livestock production via increases in the area under cultivation in selected savannah or cerrado areas is the paramount objective of the POLOCENTRO program in the period 1975-79. This in part reflects macroeconomic considerations since the Central-West is expected to contribute significantly towards achieving the Second Development Plan goal of a 7% annual growth rate in agricultural output. With this target in view, the growth of agricultural production in the Central-West is projected at 9% per year. Output expansion, achieved by extending the agricultural frontier in cerrado areas, is assigned a major role in this strategy.

68. The cerrados occupy roughly 1.3 million square km and 80% of this physiographic area is located in the states of Goias, Mato Grosso and Minas Gerais. Agricultural development in the cerrados hitherto has been limited

1/ This concept measures the flow of net output released for non-agriculture use. It differs from gross output due to on-farm consumption and purchases or "buy back" of agricultural produce by the rural sector.

2/ Although the Territory of Rondonia is not examined in this report, it is worth observing that its share of ear-marked POLAMAZONIA resources has risen dramatically in 1975-77 from 8.5% to 18.3% in response to the severe socio-economic problems created by migration and spontaneous settlement. In this program-region, increasing emphasis is being given to programs for small-scale agriculture, colonization and land titling.
by the poor natural fertility of the soils, which are acidic. This has militated against previous settlement of the cerrados since the use of traditional primitive agricultural practices quickly leads to soil exhaustion and low crop yields. However, the proposition advanced by POLOCENTRO is that permanent agricultural exploitation is feasible if advanced techniques involving the use of lime, fertilizers and machinery are adopted. Application of the recommended technology would make an estimated 50,000,000 ha available for occupation in the cerrados.

69. The incorporation of 3.7 million ha into production is the principal quantitative target established for the period 1975-79. Crops will occupy a projected 1.8 million ha 1/ and livestock 1.2 million ha, with the remainder being devoted to forestry. The main crops will be rice, soybeans, corn, cotton, peanuts and pineapple. It is emphasized repeatedly that the application of modern technology is the key to the rational occupation of the cerrados. The provisions of POLOCENTRO are intended to ensure that this technology is readily available to potential program participants on terms that induce its rapid utilization in commercial agriculture.

Terms and Implementation

70. The POLOCENTRO program was given formal approval in January 1975 and will absorb Cr$12 billion in the period 1975-77, with Cr$1.5 billion being in the form of direct public investment outlays. An additional Cr$7.2 billion is allocated to complementary rural credit programs and an estimated Cr$3.3 billion of fiscal incentive funds will be invested in forestry projects. General coordination of POLOCENTRO is vested in a special group comprising representatives of the ministries engaged in the program.

71. POLOCENTRO is presented as an "integrated development program" in that implementation requires the simultaneous and coordinated application of rural credit, agricultural research and extension services, public investment in roads, rural electrification and storage facilities and land-titling activities. POLOCENTRO also is conceived as a selective program in spatial terms and its constituent policies will be applied primarily in 12 priority areas in the states of Goias, Mato Grosso and Minas Gerais. 2/

The Main Programs and Intended Beneficiaries

72. Public Expenditures. Since the POLOCENTRO priority areas have in part been selected because they already have access to minimum infrastructure facilities, notably trunk roads and electricity, sectoral distribution of public expenditures is quite diversified (Table 8). The construction of

1/ This represents roughly 5% of the area devoted to permanent and temporary crops (lavouras) in Brazil in 1970.

2/ The special coordinating group is empowered to extend the rural credit programs to other cerrado areas within these three states.
### Table 8: POLOCENTRO: PUBLIC EXPENDITURES BY AGENCY AND SECTOR, 1975-77

(In millions of 1975 Cr$)

<table>
<thead>
<tr>
<th>Source of Resources</th>
<th>1975-77</th>
<th>% Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLOCENTRO</td>
<td>927</td>
<td>73.2</td>
</tr>
<tr>
<td>BNDE</td>
<td>52</td>
<td>4.1</td>
</tr>
<tr>
<td>EMBRATER</td>
<td>109</td>
<td>8.6</td>
</tr>
<tr>
<td>EMBRAPA</td>
<td>174</td>
<td>13.7</td>
</tr>
<tr>
<td>STATE OF MINAS GERAIS</td>
<td>3</td>
<td>0.2</td>
</tr>
<tr>
<td>SUDECO</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,267</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Sectoral Allocation**

<table>
<thead>
<tr>
<th>Sector</th>
<th>1975-77</th>
<th>% Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehousing and Storage</td>
<td>501</td>
<td>39.5</td>
</tr>
<tr>
<td>Extension Services</td>
<td>184</td>
<td>14.5</td>
</tr>
<tr>
<td>Transportation</td>
<td>168</td>
<td>13.3</td>
</tr>
<tr>
<td>Power</td>
<td>126</td>
<td>9.9</td>
</tr>
<tr>
<td>Agricultural Research</td>
<td>282</td>
<td>22.2</td>
</tr>
<tr>
<td>Irrigation Systems</td>
<td>6</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Source: SUDECO, POLOCENTRO, Documento de Base, Plano de Acao, 1975-77.
storage systems, which accounts for 40% of these expenditures, will raise warehousing capacity by 455,000 tons in Goias and 430,000 tons in Mato Grosso. Agricultural research and expansion projects include the establishment of research and field experiment stations and creation of a network of extension offices within the POLOCENTRO areas.

73. Transportation expenditures will be utilized primarily to extend feeder road systems by 3,060 km in Goias and 2,360 km in Mato Grosso. Investments in the power sector are intended to extend transmission lines in order to supply electricity to rural properties, processing plants and limestone quarrying and milling projects in the selected program areas. Finally, Cr$6.0 million will be absorbed in irrigation works in the Xavantina area of Mato Grosso.

74. **Rural Credit and Agricultural Extension Services.** Special rural credit lines constitute the main policy instrument to be utilized in implementing POLOCENTRO. The credit programs will be supervised by the Central Bank and executed through its appointed financial agents, principally the Bank of Brazil, but also state government banks and commercial banks. Financial agents may utilize their own resources in POLOCENTRO and the Central Bank will subsidize these operations. That is, it will reimburse the banks for losses incurred as a result of the differences between interest rates on POLOCENTRO financing and those which normally prevail in rural credit operations. With current nominal rates of inflation between 40-45%, POLOCENTRO financing, which excludes monetary correction, clearly offers a substantial interest subsidy to prospective borrowers. Government officials indicate that special, differential financing subsidies are required under POLOCENTRO in order to ensure that agricultural undertakings in the cerrados are competitive, given the substantial inputs required of fertilizers and soil correctives.

75. The POLOCENTRO credit lines have several distinctive aspects which merit some emphasis.

(a) Credit programs can be assembled into a "package" to finance diverse investment and working capital requirements. For example, credit lines are available for such activities as initial land clearance, including the purchase or hire of heavy machinery, pasture formation, on-farm roads and electrification and the acquisition of modern inputs. In short, POLOCENTRO will finance agricultural operations and investment activities which range from the opening up of virgin land to the sale of final output.

(b) POLOCENTRO also is distinguished by the close control it seeks to exercise over the agricultural technologies and farm practices adopted in opening up the cerrados. This control will be maintained by limiting the concession of credit to projects which satisfy technical criteria. In institutional terms, financial agents will require prospective borrowers to submit formal projects and financing will be granted only to those approved by state government agricultural extension agencies.
The latter are expected to advise on project formulation, supervise subsequent implementation and cooperate closely with the program's financial agents. The close institutional link between rural credit and extension programs is a distinctive and innovative feature of POLOCENTRO.

(c) POLOCENTRO establishes a minimum loan size of 100 times the Central Bank's reference unit (unidade de referencia). This rule gives a minimum loan size of Cr$50,000 (US$5,500) at current 1975 prices. No upper loan limit was imposed before January 1977, although project financing in excess of Cr$10 million (US$1.1 million) must be approved by the Central Bank. This upper limit now has been set at 15,000 reference units, roughly US$800,000.

(d) POLOCENTRO credit lines will finance projects to produce modern inputs, notably limestone quarries and milling plants and industrial enterprises engaged in meat-packing and crop-processing.

(e) The new program offers strong support for agricultural mechanization and machinery purchases can be financed at the subsidized rate of 15% over a 12-year period. Furthermore, POLOCENTRO will finance state government agencies, cooperatives and private firms which acquire heavy equipment and tractors for leasing to farm establishments in the cerrados. Two state agencies, CODEMAT in Mato Grosso and GOIASRURAL in Goias, already execute mechanized tasks for private farm enterprises involving initial land clearance, on-farm roads, dam construction, irrigation works, drainage and soil conservation. The Government estimates that implementation of POLOCENTRO will require 1,000 caterpillar tracked machines in 1975-76 and 21,000 farm tractors in the period 1975-77.

76. Intended Beneficiaries. POLOCENTRO is intended to "... promote the development and modernization of agricultural activities in the Central-West Region .... via the rational occupation of areas with cerrado characteristics and their exploitation on an entrepreneurial scale." 1/ The emphasis on corporate or commercial organized establishments as intended beneficiaries is a preeminent feature of POLOCENTRO. It is apparent in the provisions relating to project submission, minimum loan size, real collateral requirements, on-farm capital formation, mechanization, etc. Indeed, prospective beneficiaries are defined as "... those prepared to observe the recommendations of extension agencies and who indubitably demonstrate enthusiasm for agricultural production on a commercial basis." 2/

1/ POLOCENTRO, Regulamento, Article 1.

2/ Ibid., Article 9.
Program Areas. POLOCENTRO initially designated 12 priority areas: five in Goias, four in Mato Grosso and three in Minas Gerais. The areas selected in the Central-West, with estimates of the land to be brought into production in 1975-79, are as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Land (1,000 ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goias</strong></td>
<td></td>
</tr>
<tr>
<td>Gurupi</td>
<td>225</td>
</tr>
<tr>
<td>Parana</td>
<td>150</td>
</tr>
<tr>
<td>Pirineus</td>
<td>150</td>
</tr>
<tr>
<td>Piranhas</td>
<td>75</td>
</tr>
<tr>
<td>Rio Verde</td>
<td>400</td>
</tr>
<tr>
<td><strong>Mato Grosso</strong></td>
<td></td>
</tr>
<tr>
<td>Campo Grande-Tres Lagoas</td>
<td>500</td>
</tr>
<tr>
<td>Bodoquena</td>
<td>150</td>
</tr>
<tr>
<td>Xavantina</td>
<td>75</td>
</tr>
<tr>
<td>Parecis</td>
<td>275</td>
</tr>
</tbody>
</table>

In October 1975, the POLOCENTRO program was extended to include an additional 35 municipios in Goais and 24 in Mato Grosso.

In addition to their agricultural potential, several general criteria were used to select the 12 original priority areas of POLOCENTRO. These include proximity to limestone deposits and ready access to the trunk road system and the electricity grid. The presence of large-scale agricultural and livestock projects was an important consideration in the selection of several relatively isolated areas of the cerrados. These projects are regarded as performing valuable leadership functions which will attract other private enterprises by their example. In such areas as Parecis (MT) and Rio Verde (GO), POLOCENTRO is intended specifically to support pioneering projects and so give impetus to further development.

Policy Issues

The major development issue concerns the virtually exclusive focus of the heavily subsidized POLOCENTRO programs on large, commercially organized establishments. The rationale for this policy apparently rests on the assumption that the recommended technology in cerrado areas is beyond the absorptive capacity (financial and technical) of small farmers. It is not clear, however, that the recommended technology is efficient only for large-scale applications. There is an urgent need to determine whether the scale economies of the recommended cerrado technology are significant and to identify the key indivisibilities which limit its adoption by small farmers. Such research may produce alternative technologies and indicate institutional means of circumventing factor indivisibilities.

If the recommended cerrado technology is "scale neutral," the POLOCENTRO strategy could only be defended on the grounds that immediate,
rapid output expansion is imperative and that it is difficult to adapt the present institutional framework to meet the needs of small farmers. Once this position is accepted, then large farmers become virtually the sole beneficiaries of technical innovation whose cost is heavily subsidized by the Government. The concentrated, unequal distribution of the benefits of technical innovation in turn would aggravate the concentration of the rural income distribution.

81. In macroeconomic policy statements, occupation of agricultural frontier areas such as the Central-West is assigned a major role in the creation of productive employment opportunities and improving the access of landless migrants to land ownership. Although labor absorption will increase as project implementation proceeds, the interest rate subsidies extended by POLOCENTRO to rural capital formation and agricultural mechanization would tend to restrict employment creation. In more general terms, the introduction of interest rate subsidies would tend to distort relative factor prices and accentuate imperfections in rural factor markets. On the second point, POLOCENTRO discriminates in favor of large-scale establishments in the 12 priority areas because of the restrictive criteria employed in granting access to programs which subsidize both the costs of technical innovation and current operating expenses. With the possible exception of cooperatives, POLOCENTRO does not make a contribution towards widening the structure of land ownership by encouraging the formation of a broadly based class of small owner-operators in one of the few remaining regions in Brazil where this objective may still be feasible.

82. A final issue concerns whether the technology currently recommended for the cerrados can sustain permanent cultivation in these areas. Agronomic research and field experience presently available in Brazil indicates that this is the case. However, although research on the cerrados has been intensified under EMBRAPA programs, it will be many years before the results of the present expanded research effort are available for practical application. Although there are insufficient data to evaluate this issue, the possibility remains that current techniques may lead to soil exhaustion and declining yields in the medium term. 1/ If this outcome occurs, many POLOCENTRO areas could revert to their present use for extensive cattle-ranching. This key issue should be monitored closely as new research data and wider field experiences are accumulated.

E. The Special Program for the Development of the Pantanal (PRODEPAN)

83. The PRODEPAN program was established in May 1974 and allocated Cr$650 million for the period 1974-76. As in the other regional programs, 1/

1/ For a recent review of evidence pertinent to this question, see Robert W. Pearson, Soil Acidity and Liming in the Humid Tropics, Cornell International Agricultural Bulletin, June 30, 1975.
investment in infrastructure dominates expenditures. Extension of the program for a further three years, currently under discussion, appears likely. As in the case of other special programs, coordination is assigned to a special group of ministerial representatives. The general objectives are to integrate the region more closely into the national economy and achieve "... a better utilization of its abundant resources."

84. Immediate PRODEPAN goals are to strengthen the region’s basic infrastructure (outlays for this purpose dominate planned government expenditures) and raise agricultural productivity, especially in cattle-ranching, through improvements in pasture and livestock management. Livestock production at present relies on extremely extensive methods with natural, unimproved pasture and poor quality cattle. Rates of reproduction and live weight at slaughter are significantly below the corresponding national averages. The Pantanal primarily serves as a cattle-breeding area; fattening and processing occur outside the immediate region, with a concomitant loss of industrial value added and tax revenue to the local economy. The PRODEPAN program seeks to modify this situation by promoting greater integration of livestock production and processing activities within the immediate region.

Transportation

85. The purpose of transport investment is to link cattle-ranching areas with several processing and commercial centers, notably Corumba, Cuiaba and Campo Grande. First phase construction projects will concentrate on improving the feeder road network serving Corumba in order to strengthen its economic position. This, together with industrial promotion programs in Corumba, is intended to provide an alternative to increasing concentration of economic activity in Campo Grande. The absence of all weather roads which traverse the Pantanal and so link it to the national trunk road system also is regarded as an obstacle to future development. Construction of the Trans-Pantanal highway between Cuiaba and Corumba will ameliorate this situation. Other transportation projects include the modernization of railroad connections and the expansion of river transport.

Flood Control and Drainage

86. PRODEPAN projects in this sector seek to restrict excessive flooding and, in the dry season, ensure a more adequate and evenly distributed water supply. Current projects are regarded as the first step of a long range program of flood control and water resource utilization which will permit more rational use of pasture land and raise the area’s livestock production capacity. PRODEPAN programs for 1974-76 comprise the following:

(a) regulation of the upper Paraguay River and its main tributaries, including construction of a dam on the River Cuiba;

(b) drainage canal construction;

(c) rural well-digging; and

(d) construction of experimental polders in Corumba.
The National Department of Sanitation Works (DNOS) will formulate and execute these projects. For several years now, DNOS has conducted a research program on the Pantanal River drainage system in conjunction with specialized United Nations agencies.

Power

87. Projects in this sector are limited to the extension of transmission lines and the installation of substations in major towns.

Beef Cattle Development

88. A variety of research, rural credit and extension programs are proposed to expand productivity and output in cattle-ranching. EMBRAPA will establish a research unit in the Corumba area to examine beef cattle production, pasture and soil resources and recommend changes in existing farm management practices. 1/

Industry

89. SUDECO is required to undertake prefeasibility studies and industrial promotion in order to accelerate utilization of local mineral resources (iron ore, phosphates, manganese and limestone) and agricultural products. Cr$40 million is earmarked for financing meat-packing plants.

Policy Issues

90. PRODEPAN raises issues similar to those of the POLAMAZONIA and POLOCENTRO programs but in less acute form, mainly because the Pantanal is unlikely to become a major area of new agricultural settlement, at least in the next decade or so. Natural conditions unfavorable to rainfed crop agriculture and well-established land tenure patterns combine to deter a substantial influx of rural migrants. Although PRODEPAN objectives also are based mainly on efficiency criteria, significant output gains are unlikely in the shortrun because of the difficulty of removing natural obstacles which restrict extension of the area devoted to pasture, particularly the annual floods. This constraint on output growth by extensive means suggests that expansion will require improvements in livestock quality and pasture formation and the diffusion of better management practices. These processes take a considerable time to achieve momentum and have an appreciable quantitative effect on production. Moreover, long experience of fluctuating livestock losses due to the varying severity of the floods has discouraged the general introduction of more intensive methods of cattle-ranching. Therefore, although PRODEPAN will reinforce the specialization of the Pantanal in cattle raising, it will not achieve a rapid transformation of the present extensive scale of these operations.

1/ For further details, see EMBRAPA: Programa de Pesquisa no Pantanal Matogrossense - Subsídio Para o PRODEPAN (October 1975).
91. PRODEPAN represents a straightforward attempt to strengthen the Pantanal's extremely poor infrastructure facilities, especially roads. As a result of the lack of all-weather roads, abnormal flood levels cause significant livestock losses as large areas are completely isolated. The feeder road network will not only improve mobility but also provide cattle with a refuge and so reduce losses by drowning. Improvements in the distribution of the water supply during the prolonged dry season also will contribute to beef production.

92. Given the highly concentrated pattern of land ownership in the Pantanal, a relatively limited number of large proprietors inevitably will be among the principal beneficiaries of PRODEPAN. Cattle-ranching in the present extensive scale is not a labor-intensive activity and the employment effects of PRODEPAN will be felt primarily in the processing industries and tertiary sectors of local urban centers.

93. By virtue of its geographical isolation and physical characteristics, the Pantanal remains a vast area with an immensely rich variety of flora and fauna. It includes many species which are in danger of extinction elsewhere in Brazil and the Americas. It is opportune to consider the creation of a system of nature reserves and national parks for the Pantanal before the development process makes excessive and irrevocable inroads on this valuable natural heritage. The PRODEPAN program proposes research studies that will investigate how the expansion cattle-raising capacity can be achieved without causing devastation of the Pantanal's complex and fragile ecosystem.

F. The Special Program for the Geo-Economic Area of Brasilia

General Objectives

94. The program for the Brasilia Region, which includes selected areas in Goias and Minas Gerais, was approved in February 1975 and will absorb Cr$1.6 billion at 1975 prices during the years 1975-77. The state governments of Goias and Minas Gerais and the Federal District are required to contribute approximately 50% of the program resources. The new program complements POLOCENTRO since it is intended to foment economic expansion in towns and agricultural areas on the periphery of Brasilia. Such expansion will facilitate the reorientation of migratory flows away from Brasilia and increase agricultural and food production in the Brasilia hinterland.

95. The Brasilia program reflects official concern that migration to the federal capital significantly will exceed its capacity to generate

1/ 1967 INCRA data indicate that 203 establishments of 10,000 ha or more held 62% of the land in the Pantanal microregion. A further 855 establishments of 1,000 to 10,000 ha owned 34%.
productive employment opportunities, creating serious social problems. These include the familiar manifestations of explosive urban population growth and extensive low-income employment, such as deficient housing and sanitary facilities, inadequate health and education services, malnutrition, vagrancy and crime. The rapid rate and absolute size of in-migration continues to aggravate these problems placing excessive demands on basic social services, particularly housing, health and education.

96. Against this background, it is clear that the current program follows upon a prior decision to preserve the character of Brasilia as a governmental and administrative center. Within this conception of Brasilia's urban functions, primary production and secondary industries will be concentrated in outlying areas on the periphery of the geoeconomic region of the federal capital. In the long run, this spatial strategy seeks to establish a more balanced and uniform urban hierarchy, which will arrest any incipient tendency for Brasilia to become a sprawling, unwieldy conurbation.

97. Program areas were selected primarily for their capacity to absorb the migratory population contingents currently directed towards Brasilia. The five areas chosen can be regarded as "buffer zones" strategically located along migration routes forming a protective cordon around Brasilia. 1/ Apart from the anticipated decline of in-migration pressure on Brasilia's services also will be relieved directly by improving the social infrastructure of the towns in the immediate vicinity of the federal capital, the so-called cidades satelites (satellite cities) which house the bulk of the unskilled, low-income population of Brasilia.

Sectoral Programs

98. Urban centers in the selected program areas will benefit from policy measures intended to raise the quality and availability of social services. Education programs concentrate on the construction and equipment of primary and secondary schools and teacher training. Programs in health and sanitation involve the establishment and improvement of community health posts (unidades sanitarias), water supply facilities and sewerage systems.

1/ A cordon sanitaire approach also characterizes agricultural land use policy within the Federal District. Credit and other measures are being used to accelerate agricultural occupation by projects involving capital-intensive livestock production and mechanized arable farming. Federal officials are among the principal beneficiaries of these investment opportunities. This policy is intended to discourage the entry of migrant labor and subsistence farmers, so reducing the risk that minifundio agriculture will develop around Brasilia. Concomitantly, the earlier policy of establishing rural nuclei (nucleos rurais) of small farmers producing vegetables and horticultural produce has been abandoned.
99. Other infrastructure projects comprise feeder roads networks, warehouse construction, electricity distribution and telecommunications installations. Expenditures in rural development programs are intended to improve agricultural research and extension services. Agricultural output growth also will be supported by measures to extend rural credit and stimulate investment in agro-industry projects. The creation of mobile units with heavy tractors and agricultural implements for hire by farmers undertaking land clearance and landscaping also is envisaged in the Brasilia program.

100. These sectoral programs will be executed by a variety of federal ministries, SUDECO and state government agencies. Representatives of these entities form a special group which will supervise implementation and furnish general coordination.

A Brief Evaluation

101. Evaluation of the Brasilia program is inhibited by the absence of detailed information on component subprograms. More specifically, it is difficult to assess the likely magnitude of employment creation in the program areas. Prospective investment opportunities in mining, agro-industry and manufacturing are discussed only in vague terms and provide no basis for estimates of labor absorption.

102. A second serious omission is the failure to formulate even the general framework of the agricultural settlement policy to be pursued under the Brasilia program. Several program areas, and particularly the Parana valley and Paracatu areas, are intended to absorb rural migratory flows. Performance of this function presumably depends on their capacity to create possibilities of permanent settlement for large numbers of rural migrants. However, the Brasilia program at present offers no indication of the type of settlement pattern and associated land tenure structure required to realize this objective. This question deserves careful consideration if the sparsely populated "buffer zones" are to absorb rural migrants in significant numbers. Agricultural settlement along the lines promoted by POLAMAZONIA and POLOCENTRO will not resolve the problem. The agricultural development zones of the Brasilia program will not fulfill their labor absorption functions unless land settlement and land use policies are defined and adapted explicitly for this purpose. In their absence, relatively large-scale farm establishments with low labor requirements will tend to predominate. If this sequence of events were to occur, the long term objectives of the Brasilia program could be placed in jeopardy as rural migrants from the Northeast and other long settled regions would continue to be attracted to Brasilia and its overcrowded satellite towns.

103. A final point concerns the need to complement the new Brasilia program by measures which extend the spectrum of employment opportunities for low-income groups within the federal district. Action may be required to prevent the emergence of serious unemployment as the present, very rapid pace of civil construction declines. Measures to promote the location of relatively labor intensive branches of light industry, including electrical
components, clothing and pharmaceuticals, as well as research and development activities might be considered. Industrial growth along these lines could enhance both the welfare of its low-income population and the vitality of the urban economy without prejudice to the favorable environment Brasilia enjoys.

G. Special Development Program for the Greater Dourados Region (PRODEGRAN)

104. This new program for the Greater Dourados Region of southern Mato Grosso was introduced in April 1976 by the Federal Government and completes the array of new policy measures intended to orient development and settlement in the Central-West. The program region of Dourados has an area of 78,000 sq km and roughly 500,000 inhabitants. The region's topography consists mainly of gently rolling grasslands which lends themselves readily to mechanized agriculture. Its soils offer good prospects for permanent cultivation given the adequate application of additives, mainly lime, and fertilizers and adoption of appropriate crop rotations. 1/ In short, the physical characteristics of the Dourados Region favor the "... development of high productivity agriculture via the introduction of more advanced technology in the productive system." 2/

105. SUDECO estimates that the region possesses 6,000,000 ha of good to average quality agricultural land. It suggests as the central program objective that "... the area devoted to cereal and oilseed production be increased from 1,000,000 to 5,000,000 ha and maintained at this level with the utilization of advanced technology." 3/ The preliminary target established by SUDECO for the period 1975-79 is to incorporate 1.1 million ha into production. SUDECO supports the creation of a special federal program to achieve this goal on the grounds of added export earnings and, in the case of domestic wheat production, foreign exchange savings.

106. The initial program for 1975-79 has been allocated Cr$472 million at 1975 prices. The program calls for construction of additional warehouse and silo capacity, building 1,500 km of new feeder roads and upgrading and maintaining rural roads, installing electric generating stations and transmission lines and programs for prevention of soil erosion. Infrastructure projects would absorb about one-third of the program's resources, the remainder would go into credit for crop production and agro-industry.

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1/ The principal geological formation comprises caiua sandstone of basalt origin. The region's sandy soils, both quartzose and dark red latosols, are very prone to erosion.


3/ SUDECO, op. cit., p. 2. Emphasis in the original.
General Comments

107. By virtue of its geographical position, the Dourados Region has long attracted migratory flows and there are several public colonization projects in this area. However, these projects of small-family farm units have not brought any fundamental change in the traditionally extensive, pastoral pattern of land use. The cadastral survey of 1967 indicates that 1,300 properties of 1,000 ha or more account for 72% of the area in the two subregions which form the Dourados program area. 

1/ This area is now experiencing spectacular agricultural expansion as the investment possibilities of mechanized farming and relatively good market connections are realized. Land hitherto used for extensive pasture is being converted to the production of rice, soybeans, wheat, peanuts and castor beans. The central purpose of the Dourados program is to accelerate and consolidate this process.

108. The key question remains whether the settlement model implied by the Dourados program is the appropriate one. That is, the emphasis on credit and investment financing suggests that large commercial enterprises will be the principal beneficiaries, given present institutional arrangements. If this is the case, the Dourados program represents a further example of an income-concentrating agricultural development strategy. As in the case of POLOCENTRO, the priority attached to the speed of large-scale mechanized operations in bringing land into cultivation seems to explain the selection of this settlement model. It is legitimate to ask whether it would be possible to realize these production objectives with smaller, more labor-intensive units if appropriate institutional changes were introduced. A related question concerns the extent to which indivisibilities in the technologies recommended for the Dourados Region inhibit their adoption by small farmers, particularly if cooperative arrangements or credit facilities for equipment-leasing were introduced. These questions are especially pertinent in the case of the Dourados Region given its favorable location vis-a-vis major urban markets. This access would enhance the chances of success of settlement and land use patterns in which small farmers have a more prominent role.

1/ The two subregions are Campos de Vacaria e Mata de Dourados and Bodoquena and the municipio of Maracaju.
III. THE PROCESS OF FRONTIER OCCUPATION AND AGRICULTURAL SETTLEMENT IN THE CENTRAL-WEST REGION

109. The following discussion examines some aspects of recent agricultural settlement in the Central-West. 1/ The purpose is to distinguish the alternative approaches or "models" which characterize this process. Although the discussion is general and schematic, it serves to identify some major policy issues arising from the extension of the agricultural frontier.

A. Alternative Approaches to Rural Settlement

110. The types of rural settlement are distinguished initially by differences in the degree and timing of public sector participation. Agricultural settlement via official colonization projects or the sale of public lands requires policy decisions. Such decisions may either anticipate agricultural occupation or represent an ex post response to problems created as settlement proceeds. Where the state plays a passive role, more spontaneous forms of settlement will emerge from the interaction between rural migrants, existing land tenure structures and the institutional framework.

111. A preliminary taxonomy of settlement processes which have characterized the recent opening up of agricultural frontier areas in the Central-West would include the following:

(a) public colonization schemes;
(b) settlement by private colonization companies;
(c) sales of public lands; and
(d) spontaneous occupation and settlement.

112. The brief exposition of these settlement "models" given below is based primarily on recent experience in Mato Grosso. However, similar processes can be observed in the state of Goias and, more recently, the Federal Territory of Rondonia. 2/

1/ In the present discussion, settlement is defined as the occupation and cultivation of land for agricultural purposes, including both subsistence and commercial production.

Public Colonization Schemes

113. The first public colonization projects in Mato Grosso were undertaken by the state government in the years 1912-17. This initial flurry of activity was not sustained, however, and the majority of state government projects were created after 1940. The agency now responsible for state government colonization schemes, CODEMAT (Companhia de Desenvolvimento do Estado do Mato Grosso), currently has over 40 projects under its supervision. The area incorporated in these projects represents less than 2% of the total area of Mato Grosso and over two-thirds of these projects occupy under 5,000 ha. 1/

114. Federal government colonization in Mato Grosso began in 1943 with the creation of the National Agricultural Colony in an area of 800,000 ha in the Dourados Region. 2/ the Dourados project continued to attract settlers until the later 1960s and approximately 9,500 families have been direct beneficiaries of federal land grants in this area. The vast majority of these colonos families received holdings of 30 ha, the typical or "module" size established for the Dourados scheme. 3/ A second federal project was established in 1968 in the Iguatemi area of southern Mato Grosso near the state border with Parana. The total project area is 73,000 ha, and 1,094 families had been settled on holdings of 30 to 60 ha by 1972. 4/

115. These projects are examples of controlled or directed settlement in previously selected areas where official agencies can exercise close control over the design and execution of colonization, including the size of holdings, selection of settlers, cropping patterns, output mix, and the installation of economic and social infrastructure.

State Government Colonization Schemes

116. In contrast to federal experience, state government colonization policy in Mato Grosso has evolved as an ad hoc response to land tenure

1/ Only 12 state government projects exceed this size and are distributed as follows: 3 - 5,000-10,000 ha; 5 - 10,000-20,000 ha; 3 - 20,000-100,000 ha; and 1 - 100,000-200,000 ha.

2/ The Vargas administration placed the extreme south of Mato Grosso under federal jurisdiction by establishing the Federal Territory of Ponta Pora in 1943. This measure was used to circumvent state government opposition to the location of the federal colonization scheme in Dourados.

3/ For further details, see Estado de Mato Grosso: Diagnostic Economico, III B: Colonizacao (1973).

problem arising in the course of rural migration and settlement. It is no coincidence that the sequence and the location of state government projects follow the northerly movement of migrants from the Dourados area to Rondonopolis and subsequently to Caceres. These are the major subregions in the state where natural soil fertility makes it feasible to establish small subsistence family farm units at existing, primitive levels of technology. At present, rural migratory flows are directed northwesterly towards the Guapore Region near the town of Mato Grosso (Vila Bela) and thence to the Federal Territories of Rondonia and Acre in the Amazon Basin.

117. State government colonization projects mainly have emerged as the result of intervention to resolve violent land disputes. 1/ These projects thus represent a reflexive, in some ways passive, response to rapid rural immigration. One important corollary is that the location of these projects and many aspects of their design are imposed by force of circumstance. This is a major point to consider when assessing the efficacy of previous state government colonization programs. Projects undertaken in conditions of extreme social unrest and violence inevitably attach first priority to resolving tenure conflicts and must largely adapt to existing or exogenous conditions of settlement. The provision and improvement of infrastructure facilities and programs to mobilize effective support for settlers from extension services and the banking system are relegated to subsequent phases of the project. This phasing frequently leads to total or partial failure to implement these support programs as new foci of rural unrest emerge and divert political attention. A further complication experienced in Mato Grosso arises from the invasion of areas designated as public colonization projects by rural migrants attracted by the prospect of receiving legal title to the land.

118. The emphasis on immediate land tenure issues rather than provision of rural infrastructure and production services may, in part, explain the high abandonment rates found in these public projects. 2/ However, the impermanence of small-farm arable activities characterizes both official and spontaneous settlement and presents a major challenge to development policy in the Central-West. The itinerant process of frontier occupation and cultivation constantly renews rural migratory flows and leads to the reconcentration of land holdings in areas of relatively recent settlement, including public colonization projects.

119. The reconcentration of land ownership typically is characterized by the reversion of cultivated holdings to pasture, reducing both employment opportunities and income flows. One study estimates that some 40% of the

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1/ These disputes, which frequently involve armed violence and range wars, are generated by a very complex combination of factors. For discussion of some general causes, see paragraphs 138-142.

2/ See Estado de Mato Grosso, Colonizacao, op. cit. Also Adeja de Aquino, "Um Estudo Sobre Colonizacao em Mato Grosso," mimeo, Cuiaba, 1975.
land initially devoted to crop agriculture in areas that were extremely subdivided by colonization in the Dourados and Rondonopolis (Vale de Sao Lourenco) Regions is now in pasture. 1/ In a similar vein, a CODEMAT study of 929 holdings on 15 state government colonization schemes (colonias) in 1972 indicates that 89 properties of less than 10 ha account for 1% of the total area surveyed, whereas 87 establishments exceeding 100 ha hold 46.3%. This concentrated distribution of land ownership following the initial colonization and allocation of land parcels is attributed to a sequential process involving soil exhaustion, declining yields, fragmentation of holdings, sales to wealthier neighbors and migration to new lands. 2/ The CODEMAT survey also reveals an active market in land on public settlement projects. Although all holdings originally were acquired as the result of state land grants, 62% of the properties covered by the survey have been purchased by their present owners.

120. Many of the difficulties which have characterized state colonization projects reflect the historical circumstances surrounding their creation. That is, situations of social tension and the concomitant preeminence of political considerations in project formulation. These origins in part explain the limited area of many projects and the small size of individual land grant parcels. Political factors also have exercised a powerful influence upon the subsequent management of state government colonias. In consequence, the intensity of financial and institutional support to the colonias has varied considerably, often in direct relation to the exigencies of the electoral calendar and the prospects of particular candidates and political parties. Inadequate or uneven support appears to be one factor underlying the migration from the colonias which gives rise to the reconcentration of land ownership. Certainly, the "... precarious infrastructure conditions, principally in relation to the commercialization of agricultural products (transport and storage) as well as ... deficiencies in the rural credit system ..." 3/ in colonization areas must be considered when evaluating the performance of state government projects.

121. Political problems have also imposed severe strains on the agencies charged with project implementation. Budgetary constraints have aggravated project management difficulties and, in recent years, prevented the introduction of new state government schemes. Because of these factors, the potential of colonization as an instrument of settlement policy has not yet been fairly tested in Mato Grosso and past experience may not be a true indication of the role colonization projects can play in creating permanent settlement opportunities. The elaboration of a policy framework which permits this


2/ Estado de Mato Grosso, "Diagnostico Economico, III B Colonizacao, op. cit., p. 27.

contribution to be realized as frontier occupation proceeds warrants high priority. 1/ The present state government and the state development agency responsible for colonization programs, CODEMAT, are actively seeking to implement new settlement projects. This agency received assistance from the FAO-IBRD Cooperative Program, is designing colonization project in the Aripuana area of northern Mato Grosso. However, the federal government is unlikely to support state colonization schemes in this region before the 1980s and it is concentrating its efforts on settlement projects and land titling activities in Rondonia.

Private Colonization Schemes

122. Private colonization in Mato Grosso has a checkered history and two distinct phases can be distinguished. 2/ The first followed the introduction of legislation in 1949 authorizing the sale of public land to private colonization companies. The state of Mato Grosso signed preliminary contracts with some 20 companies in the years 1951-53 and reserved roughly 4.0 million ha for these projects. The companies were required to undertake initial land clearance and road construction and provide limited social infrastructure facilities such as schools and health posts before receiving legal title from the state. The vast majority of the contracting firms failed to satisfy these conditions, and their projects gradually were abandoned. However, this process was protracted and the settlement which occurred in the interim generated complex land title disputes in the project areas. Some of the companies involved in these abortive schemes "contributed to the creation of situations of social tension in the state." 3/

123. In more recent years, there has been renewed interest in private colonization, particularly following the advent of PROTERRA in 1971. This federal program includes credit lines to finance land purchase for agricultural projects and private colonization schemes in the area of Amazonia Legal. Several large tracts of land in the Juruena Region of northwestern Mato Grosso have been sold by the state government for private colonization. Two of the largest projects are being executed by Colonizadora SINOP S/A and INDECO, the latter has purchased 400,000 ha from the state and further holdings from private landowners. These firms essentially are land development companies to which the state government has delegated responsibility for frontier occupation.

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1/ A further issue concerns the type of public colonization project to be incorporated in this framework, particularly the degree of government participation and direction.

2/ Private colonization projects undertaken before 1950, notably in southern Mato Grosso, whose settlers have long since received title are excluded from this discussion. Similarly, private landowners who divide their properties for sale in smaller lots are not considered since public agencies have limited control over such activities.

3/ Estado de Mato Grosso, Diagnostico Economico - Colonizacao, p. 11. Currently, there are 46 private companies involved in colonization in Mato Grosso. Only 7 of these are recognized as bona fide companies by INCRA.
124. Detailed evaluation of recent private colonization schemes is difficult since the majority are still engaged in initial implementation rather than the rural settlement phase. Secondly, the vast distances and geographical isolation of the project areas restrict the number of on-site visits that can be undertaken in a short period of time. This leads to reliance on second-hand evidence which is difficult to substantiate directly. Nevertheless, there have been several reports that settlers were abandoning their holdings in the SINOP project due to the low natural fertility of the soils. The personnel of the FAO-IBRD Cooperative Program also reported that in some cases private colonization companies simply provided an access road and demarcated land parcels for sale, subsequently leaving the settlers to their own devices. In other cases, land parcels were purchased by absentee buyers and local commercial interests for speculative purposes rather than agricultural use. On the other hand, experienced colonization companies, such as INDECO, plan to undertake substantial investments in social and economic infrastructure, furnish modern inputs and technical assistance, encourage the formation of cooperatives, and carefully screen prospective settlers. Clearly, there is a wide range of private colonization schemes which differ in terms of project characteristics and results achieved. This diversity, and the limited direct evidence available for many projects due to their relatively short history, suggests that it would be premature to assess this recent experience in detail.

125. State and federal government officials indicate that large-scale private colonization projects will occupy an important role in Central-West settlement strategy, particularly in northern Mato Grosso. This decision is based primarily on an assessment of the absorptive capacity of colonization projects which the public sector reasonably can be expected to implement within the next five years. This capacity apparently falls considerably below the probable magnitude of rural in-migration. Shortages of trained staff, particularly technical personnel, are cited as a major constraint on the public sector's ability to execute settlement schemes. Certainly, public agencies as presently structured and financed can implement only a limited number of projects simultaneously. 1/ Although precise estimates are difficult since project design will determine the input of administrative and technical resources required, institutional constraints restrict the scope of public colonization as an instrument of land settlement, at least in the short run.

Some Issues of Private Colonization

126. The constraints on public colonization emphasize that frontier settlement will have to involve several different approaches, and the case for private colonization can be made on pragmatic grounds. Support for private schemes, as well as land sales to large farm enterprises, also springs from official concern that migrants will invade public lands.

1/ The Mato Grosso Land Settlement Project in the municipio of Aripuana prepared in conjunction with the FAO-IBRD Cooperative Program envisaged the settlement initially of 6,000 families in the project area of 420,000 ha. It is likely that only 2-4 schemes of this size and complexity could be implemented before 1980 with the present organizational structure and resources.
creating acute land tenure problems and areas of uneconomic minifundia agriculture. This concern is legitimate, particularly when uncontrolled occupation leads to soil exhaustion and shifting patterns of cultivation. However, land sales to large-scale private undertakings may not represent the best alternative to spontaneous settlement by small farmers. This policy does not assuage the land hunger of the poor; it merely erects property barriers to access to land previously in the public domain. In seeking to avoid immediate tenure problems, more severe difficulties may be generated as the availability of new lands for settlement is exhausted. The task of devising settlement policies which give employment and income opportunities to the poor and landless cannot be postponed indefinitely. 1/ Widespread, indiscriminate land sales in unsettled areas narrow the scope for such policies.

127. Although private colonization will be used to open up frontier lands, these considerations argue for selective use of this instrument. Furthermore, resort to private colonization by no means precludes public intervention in project design and execution. Some public control over project characteristics is required to direct the subsequent settlement process towards the achievement of employment and equity objectives. Specifically, detailed attention should be devoted to establishing guidelines for the sale and use of public lands which incorporate these aims. 2/ This issue of settlement policy has largely been neglected so far. The practice of selling public lands for private colonization at nominal prices reinforces the case for ensuring that some provision is made for small farmers. 3/

128. Application of investment criteria and legal sanctions to private colonization projects on public lands would enable public agencies to influence such project characteristics as size of holding, number of holdings per settler, resale conditions and terms of financing. Colonization companies also

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1/ A recent estimate puts the number of landless rural workers, agricultores sem terra, in the Central-West at 370,000. See CODEMAT, "Consideracoes Sobre os Anteprojetos de Colonizacao: Rio Alegre e Aripuana," mineo., Cuiba, 1974.

2/ The Land Statute of 1964, Estatuto da Terra, represents one step in this direction since it establishes size limits for property sales to private interests in the areas under INCRA jurisdiction. These areas comprise land within 150 km of international frontiers and 100 km on each side of federal highways in Amazonia Legal. Decree No. 1414 of August 1975 also sets limits on the size of individual holdings in designated frontier areas.

3/ Income gains from the subsequent appreciation of land values, which often receives impetus from public infrastructure investment, rarely are appropriated by the community through taxation. The basic rate of land taxation in Brazil is low and infrequent adjustments in the declared land values used for tax purposes to take account of appreciation further reduce the land tax burden.
could be required to establish minimum infrastructure facilities and, in con-
junction with government agencies, ensure provision of rural development ser-
vices. In isolated areas, public agencies may need to intervene to prevent
exploitation of settlers arising from the abuse of monopoly and monopsonistic
positions. 1/ The colonization company frequently is the only local source of
production inputs and consumer goods and the sole purchaser and processing
agent of final output. 2/ In short, although the Government may utilize
private colonization companies to open up new lands, the wider social objective
of frontier development will be jeopardized if all control over this form of settlement and land use is relinquished.

129. Even colonization projects which provide opportunities for small
farmers and family units will appear land and labor extensive when compared
with farms in regions of earlier settlement. Soil and ecological conditions
in pre-Amazonia areas may be such that relatively large holdings of 100-300 ha
are required to ensure permanent settlement by family units. 3/ If this is
the case, special terms of financing for land purchase will be needed to
secure access for the rural poor. For example, the price of land in parcels
of up to 500 ha in the INDECO project area was roughly Cr$1,200 per ha or
US$160 in January 1975. 4/ Moreover, INDECO's terms require an initial
down payment of 50% of the purchase price and payment of the outstanding sum within
two years. This effectively puts such purchases out of the reach of poorer
farmers.

Sales of Public Lands

130. Much of the preceding discussion can be extended to frontier develop-
ment undertaken via sales of public land to private enterprises for direct
agricultural use. The present section, therefore, concentrates on current
policy measures in Mato Grosso as outlined by state government officials.

131. It appears that sales of public land by auction will be an integral
part of frontier settlement policy in the late 1970s. The state government

1/ In some cases, the commercial and agro-industrial opportunities of large-
scale settlement constitute the principal investment incentive for
colonization companies.

2/ For some observers, such monopoly and monopsony power is the central
characteristic of latifundio agriculture and pre-capitalist modes of
production. See J.R. Brandao Lopes, "Desenvolvimento e Migracoes: Uma
Abordagem Historico-Estructural," Estudos Cebrap 6, October-
December 1973, pp. 127-142.

3/ There appears to be a wide consensus on this point but firm evidence
derived from systematic study is lacking.

4/ INDECO apparently acquired its holdings from the state government in
the early 1970s at a purchase price in the region of Cr$50 per ha.
intends to alienate lands along major trunk roads, notably the Cuiaba-Santarem (BR-163), the BR-416 and the BR-070 and, in the Aripuana Region, a penetration road from Vilhena to the Humboldt research center in Aripuana is currently under construction by CODEMAT. Execution of this policy requires close cooperation with INCRA given its jurisdiction over lands within 150 km of international borders and 100 km of federal highways in Amazonia Legal. In these areas, INCRA alone can alienate public land for sale and issue definitive legal title. 1/ Very broad and unofficial estimates indicate that the state and Federal Governments retain primary ownership rights over an unsettled area of 40-50 million ha in northern Mato Grosso.

132. The holdings to be auctioned by the state government will probably range in size from 500 to 3,000 ha although no firm decision has been taken on this question. Preliminary formulations of the proposed CODEMAT settlement project in the upper Aripuana Valley set 1,500 ha as the upper size limit. 2/ However, there is some debate on the number of parcels one individual or family may purchase. This project which covers an area of 450,000 ha along the newly constructed penetration road (AR-1) between Vilhena and Humboldt will be executed by successive auctions of subdivided blocks of 90,000 ha. Each block will contain a small urban settlement where some provision will be made to demarcate small land parcels. These will comprise urban lots of 1,000 square meters for commercial purposes and small holdings of up to 50 ha for the cultivation of vegetables and horticultural products. These urban nuclei will contain only minimum infrastructure facilities, such as a health clinic and a junior school. The larger agricultural establishments of 500-1,500 ha will be ranged around the urban center and the inner band of small holdings. A proposal that successful bidders for medium- and larger-size units be required to submit project proposals which specify land use and cropping patterns currently is under discussion by state government officials. Measures to enforce rapid utilization of land for agricultural production also are being considered.

133. Although only at a formative stage as yet, the main features of the settlement policy underlying the upper Aripuana project emerge clearly. This project undertakes directed settlement rather than colonization and represents an attempt to discipline the occupation process in a major frontier area. That is, it seeks to anticipate occupation and so prevent land invasion by squatters and the ensuing land tenure disputes. As in the case of private colonization schemes, land auctions are intended to erect land tenure structures as quickly as possible in order to divert rural migrants elsewhere. Emphasis on rapid exploitation of land can be attributed to efficiency considerations, but it is also meant to consolidate land tenure patterns.

1/ State government titles granted before the Land Statute of 1964 are invalid unless confirmed by INCRA.

2/ This project was formulated independently by CODEMAT in 1975 at a time when the Guapore area was under study by the FAO-IBRD Cooperative Program as a prospective site for a colonization scheme. The poor soils encountered in the Guapore Region have since prompted the FAO-IBRD to investigate the possibility of undertaking a colonization project with CODEMAT in the Aripuana area.
134. The upper Aripuana project, initially formulated by CODEMAT, embodies a rapid, low-cost approach to frontier settlement. At least during the first phases of settlement, government participation is limited essentially to the construction of penetration and feeder roads, subdivision of land parcels and titling. One major attraction of this approach for the Brazilian authorities is the speed of execution. This feature affords an opportunity to accomplish several objectives, namely, to control frontier occupation, avoid social conflicts over rival tenure rights and bring new lands rapidly into production. Finally, the rapid, minimum infrastructure approach requires fewer scarce technical and administrative resources than directed public colonization schemes. This is a major factor in the CODEMAT decision to utilize public land auctions as an instrument of settlement.

135. In some respects, the auction system, with some minimum participation by the public sector, represents a compromise between directed state colonization and the outright, unconditional sale of land to private investors. Its place on this spectrum depends on the conditions imposed by the Government, particularly the size of holdings auctioned, the terms of purchase, access to land credit and subsequent provision. That is, the Government can determine the relative participation of various farm size categories and, hence, the initial profile of land distribution in the project area. A major issue and one which bears heavily on evaluation of the approach concerns the selection of the size distribution of holdings. Ceteris paribus, equity considerations would favor the sale of small land parcels. The selection of land use and cropping patterns which expand the supply of permanent rural employment opportunities also would receive emphasis. Within the auction system, some limited scope thus remains for the introduction of equity criteria.

Spontaneous Agricultural Settlement

136. Spontaneous settlement is the invasion and occupation of unexploited or underutilized land. In the context of an agricultural frontier region, such as the Central-West, this process can occur on the "pioneer frontier" and involve the first agricultural penetration of natural wilderness areas. The present spontaneous settlement of hitherto unoccupied, untitled public lands in northern Mato Grosso and the Territory of Rondonia falls into this category. However, an essentially similar process can follow in the wake of the advancing "pioneer frontier" as the prospect of new lands attracts rising inflows of rural migrants. In this case, spontaneous settlement will occur on land which is unexploited or underutilized but in private ownership. Settlement of this kind is found throughout the Central-West in regions with long established structures of land ownership.

137. Spontaneous settlement, whether on public lands or private property, thus is characterized by land invasion. Moreover, in each case, invasion will tend to generate conflict over occupancy rights (posse) and title. A further point is that in Mato Grosso land invasion is not solely carried out by poor, landless migrants. Private enterprises with strong financial support also resort to this tactic as a means to secure posse rights on public lands. Large-scale private interests are thus rivals, as well as occasional allies,
of small subsistence farmers in land invasion. The scope for rivalries and
alliances between these groups in the course of land settlement suggests the
myriad circumstances which can produce bitter land disputes.

Land Invasions - "Posseiros" and "Grileiros"

138. Brazilian legislation accords certain rights to individuals who take
up occupancy (posse) of land, whether public lands or private property. In
order to establish occupancy, the occupant or posseiro, must satisfy criteria
relating to residence and exploitation of the land. It must be determined that
the posseiro has occupied the holdings for over 12 months and has cultivated
and improved the land during his occupancy. Criteria for this purpose include
land clearance, cultivation of annual subsistence crops, house construction
and such investment activities as fencing and the planting of long cycle pe-
rennial crops. Individuals whose rights of posse are established are entitled
to compensation under present legislation when compelled to leave their holdings
on private property. 1/ Posse rights also can be established on public lands
and are taken into account in the process of resolving competing land claims
and titling. These conditions also extend to public lands under INCRA juris-
diction, although limits are imposed on the size of holding which can be
secured by occupation or posse.

139. Where settlement proceeds via invasion of public lands, it is easy to
see how disputes can develop over boundary limits and posse rights. However,
conflicts on privately owned property typically emerge from attempts to evict
rural families which claim posse rights. These disputes are exacerbated when
private landowners resort to extra legal methods to intimidate and remove
settlers. These conflicts in many cases involve settler sufficiently long es-
tablished to have de facto rights of posse. 2/ Extra legal methods, including
recruitment of "guards," also are used to prevent land invasions and expel
recent settlers and would-be posseiros. In all cases, conflicts arise over the
length of occupancy and claims for indemnity payments and frequently escalate
into violence with destruction of crops, the razing of houses, physical inti-
midation and, at times, the loss of life. The settlers and migrants with
posse claims may resist and retaliate, returning to their holdings or invading
land elsewhere in the same area. These elements constitute the classic situa-
tion generating continuing land disputes, with sporadic outbreaks of violence
and intimidation. There are many foci of rural unrest and periodic violence
at present in Mato Grosso, notably in the northern municipios such as Arena-
polis, Caceres, Barra dos Bugres, Diamantino, Jaciara, Dom Aquino, Barra do
Garcas, Alto Araguaia and Rondonopolis. However, similar incidents recur
throughout the history of recent settlement in many areas of Mato Grosso.

1/ This is one respect in which posseiros are distinguished from squatters
(ocupantes).

2/ Apart from occasional newspaper reports, there is little documentation of
these conflicts. However, see M. Pinto da Fonseca, "Campesinato Mato-
grossense, Caminhos e Perspectivas," Reforma Agraria, Ano IV, May-August
1974, pp. 2-10.
A similar pattern of posse conflicts and rural unrest characterizes current settlement in northern Goias, particularly in the Araguaia and Tocantins river valleys. Land disputes also are widespread in the Territory of Rondonia and affect areas penetrated by several federal highways as well as the valleys of the Mamore, Guapore, Jiparana, Jamari and Candeias. 1/ Posse disputes have also occurred on public lands sold to private groups by state government. 2/ The Ministry of Agriculture is responsible under federal legislation for resolving posseiro claims on public lands but cumbersome administrative and judicial processes can delay decisions for long periods. In practice, these decisions are taken by the immediate participants, often with violent results. Conflicts with posseiros also have arisen on lands transacted between private groups and incorporated in SUDAM agricultural projects, notably in northeastern Mato Grosso in the municipios of Barra do Garcas and Luciara.

Both the frequency and complexity of land disputes are increased by fraudulent practices involving illegal property transactions and the sale of false title deeds. These activities, known as grilagem, have accompanied the settlement process throughout Mato Grosso and greatly complicated the task of land-titling. Fraudulent sales, whether on public lands or unexploited private property, directly increase the number of rival land claimants and so aggravate social tension. Cases are reported in which unscrupulous operators (grileiros) fomented land invasion by migrants and encouraged settlers to establish posse. As this process occurred, however, the land was subdivided and sold with illegal title deeds to outside buyers. This create disputes between the posseiros, holders of illegal title and, in many cases, the lawful landowner. These practices often involve repeated fraudulent sales of the same land, superimposing one false title upon another.

Fraudulent sales are also a problem on public lands. There are cases reported of land invasion with the support of economically powerful groups which is accomplished by financing a work team to clear and subdivide land in remote frontier areas. These land parcels then are sold illegally. Alternatively, clandestine landing strips are constructed and used to fly in farm workers to undertake clearance and cultivation. These operations help to establish posse and reinforce ownership claims when official titling begins. Finally, there are cases of fraud perpetrated by illegal land colonization companies which sell false title to prospective settlers. The land in question either is privately owned or claimed by posseiros. There have been frequent reports of this kind in the municipios of Chapada dos Guimarães and Nobres in Mato Grosso.

These areas of land disputes are derived from reports in the national press, official statements of the National Confederation of Agricultural Workers (CONTAG) and mission discussions. A series of articles on land settlement in the Amazon Region published in Estado de Sao Paulo in November 1975 is of major interest.

These transactions frequently contravene the federal Land Statute of 1964, which prohibits the sale of public lands in parcels exceeding 3,000 ha without Senate approval. This culpable behavior of state governments has permitted the formation of large latifundia on public lands.
Labor Disputes - "Peons" and "Gatos"

143. A second, poorly documented feature of frontier settlement concerns the conditions of rural workers employed to fell trees and clear land for cultivation on large properties. There have been periodic reports in the Brazilian press alleging that peonage and debt bondage characterize labor relations on some large fazendas including cattle-ranching projects financed by SUDAM fiscal incentives in northeastern Mato Grosso. An official inquiry is needed to substantiate and document such reports given the geographical isolation and vast size of these properties.

144. The figure of the labor contractor, popularly called the gato or cat, is central to this situation. The labor contractor, operating on an informal basis with large landowners, undertakes to recruit the workers needed to clear forest land for pasture formation. The methods used to recruit workers involved promises of good wages, social security benefits and access to subsistence plot of land. The gato may advance cash on account and usually furnishes food, lodging and transport for the journey. Workers find it difficult to pay off these initial debts, contract further debts at the farm store and are then unable to leave the fazenda. Complaints of debt bondage are reinforced by grievances concerning the long hours and harsh conditions of work.

145. Sources of evidence again are scarce, apart from press reports and complaints registered with rural labor organizations. This is not to suggest, of course, that harsh labor conditions are typical or widespread on large establishments. Nevertheless, their reports do appear to illustrate a further facet, albeit limited, of the economic and social reality of frontier occupation.

B. The Process of Frontier Settlement: A Synopsis

146. The discussion so far has taken a cross-sectional approach which fails to give due emphasis to cyclical or sequential phases which characterize frontier occupation. These can be illustrated by adopting a schematic historical perspective based upon recent settlement patterns in Mato Grosso.

The Pioneer Phase

147. The pioneer migrant worker seeking land to cultivate for immediate subsistence needs has a prominent role in the first phase. Rural in-migration furnishes the manpower required to extend the area of agricultural settlement. Invading public lands or unexploited areas on private land holdings, migrants begin the process of land clearance, practicing a primitive slash-and-burn agriculture. The land is partially cleared by felling the larger trees and burning off the undergrowth. Short cycle annual subsistence crops, such as beans, corn, manioc and possibly, rice, often interplanted, are grown. The

1/ See, for example, O Estado de Sao Paulo, August 8, 1975.
length of continuous cultivation possible with rudimentary subsistence methods will depend upon soil characteristics and other ecological factors. However, removal of the forest cover and continuous cropping generally will lead to leaching and soil depletion after two to three years. 1/ Declining soil fertility and crop yields, combined with the hard labor of containing weeds and forest regrowth, will prompt settlers to repeat this cycle of slash-and-burn and subsistence cultivation on virgin soils elsewhere.

148. The areas abandoned in this process will be invaded by native grasses and revert to dense undergrowth. However, once cleared, the land can support extensive cattle-ranching operations and its subsequent preparation for permanent cash crops is greatly simplified. In short, the inflow of migratory labor seeking the means of subsistence enhances land values and accelerates the incorporation of frontier areas into the economic system.

149. This pattern of occupation at times is "institutionalized" in the relations of production found in frontier areas. Private landowners may grant migrant farmers access to forested areas on the understanding that the newly cleared subsistence holdings are abandoned after harvest. These areas then are planted to grass to form cattle pasture. This arrangement, which occasionally involves sharecropping relations, may continue for a period of years. However, in practice, the occupancy of these subsistence farmers is transitory and restricted to the period required for land clearance.

150. This initial pioneering phase involving the physical conquest and opening up of the agricultural frontier thus leaves areas of devastated forest and depleted soils. These, in turn, will be absorbed gradually into extensive cattle-ranching units. Small concentrations of subsistence farmers may persist where natural soil fertility remains relatively high and if they have shown sufficient tenacity to resist rival claimants. This resistance may have attracted political recognition and support leading to the formation of a public settlement (colonia) by the state government. These concentrations of small-scale farmers are found in several areas of Mato Grosso, particularly in the vicinity of Dourados, the Rondonopolis area and the Vale of Sao Lourenco and, more recently, around Caceres.

Rural Stratification and Land Consolidation

151. Out-migration of pioneer settlers from arable areas and public settlements and the subsequent consolidation of fragmented land holdings are the principal features of this second phase. In the regions devoted to small-scale family farm cultivation, differences in soil quality, entrepreneurial capacity and good fortune gradually will lead to increasing social stratification. The subdivision of original holdings through inheritance and sales to repay debts will contribute to this process. Relatively wealthy settlers will grasp opportunities to extend their holdings by purchase. These holdings then

1/ In this humid tropical region, the increased exposure to sunlight will reduce soil nutrients due to oxyzidization of organic matter.
may be sublet on a cash rent or sharecropping basis to local workers. 1/ Large landowners with fazendas in surrounding areas also are potential purchasers.

152. As this consolidation proceeds, less fortunate families increasingly will be attracted by prospects of obtaining virgin land on the advancing pioneer frontier. Soil depletion and lower crop yields appear to be potent "push" factors underlying the decision to abandon original holdings. These factors also provide the principal explanation why this consolidation process is characterized by the reversion of arable land to pasture. The outward movement from areas settled in the 1960s and the consolidation of fragmented holdings into cattle ranches is occurring at present in the Rondonopolis and Caceres Regions and on several public settlements.

Commercial Agricultural and Corporate Enterprise

153. The third phase, although occurring with a time lag, continues and reinforces the consolidation and stratification process. It is marked by the appearance of commercial owner-operator establishments and the entry of large-scale corporate enterprises. The former generally have experience of relatively advanced farm management practices and some entrepreneurial capacity as well as personal financial capital derived from the sale of previous holdings. This in-migration of relatively well-to-do farm families may be fostered by cooperative organizations as, for example, in the vicinity of Ponta Pora in the Dourados Region. In this case, members of rural cooperatives from Rio Grande do Sul have purchased holdings, typically of 500-1,000 ha, and are applying advanced mechanized techniques. The influx of these medium-sized commercial farm establishments presently is concentrated in southern Mato Grosso in the areas polarized by Dourados and Campo Grande.

154. However, the principal new entrants in the agricultural land market in the south of Mato Grosso are corporate organizations, usually with interests in industry, commerce and finance. These enterprises are acquiring large tracts of land for agriculture using mechanized methods and modern farm practices, including lime and fertilizer application, contour ploughing and crop rotations. The main crops are corn, rice and, in association, soybeans and winter wheat. In short, areas devoted to extensive cattle-grazing, including those which reverted to pasture after initial subsistence cropping, now are being incorporated into large-scale arable enterprises. The region of Dourados, notably in such municipios as Ponta Pora, Jardim, Maracaju and Rio Brilhante, offers a spectacular example of the speed and scale of this transformation. 2/ An estimated 500,000 ha have been incorporated into arable

1/ This process can be observed on the state government settlement of Rio Branco in the Caceres Region.

2/ One enterprise visited by the mission had planted 20,000 ha in rice, corn, soybeans and wheat within two years of acquiring its holdings. Cultivation is virtually completely mechanized and farm infrastructure includes modern grain drying and storage facilities.
cultivation since the late 1960s. The new PRODEGRAN program for the Greater Dourados Region is intended to increase this area to 2.0 million ha by 1980.

155. The process of opening up and incorporating frontier lands, when placed in historical perspective, creates conditions for the reproduction of latifundia. Although the agricultural frontier is extended initially by rural in-migration, largely of subsistence farmers, the ensuing territorial gains are consolidated over time by the formation and expansion of latifundia. That is, the traditional fazenda devoted to extensive cattle ranching and the large-scale corporate enterprise applying capital-intensive methods. These commercially, technologically advanced enterprises are the principal intended beneficiaries of recent government measures such as POLOCENTRO, POLAMAZONIA and the proposed Greater Dourados program.

156. Small farmers with some resources and technical expertise at their command probably will manage to remain in the interstices of this highly unequal land ownership structure. However, the landless subsistence worker and illiterate, resource-poor farmer will move forward, rejoining the onward migration to the pioneer frontier areas. The fundamental challenge of frontier settlement policy is to ensure that these poor rural population groups gain access to the land and are given sufficient institutional support to make their tenure permanent.

C. INCRA and Land-Titling

157. The importance of land-titling for frontier settlement and agricultural expansion is clear. In Brazil, possession of definitive legal title is virtually an indispensable condition for access to term financing and official institutional support. An efficient titling system as frontier development proceeds thus is likely to have favorable repercussions on productivity growth and rural capital formation. Conversely, long delays in titling disrupt the settlement process and encourage land invasion and property speculation. In these circumstances, settlement policy becomes largely a matter of ad hoc tactical interventions and improvised situational responses as distinct from execution of an overall strategy of frontier development. Official settlement measures in the Territory of Rondonia and extensive areas of Mato Grosso and Goias are more accurately consigned to the first category.

158. Delays in resolving title questions also foster the predatory, short-term exploitation of land which can lead to soil exhaustion and erosion. Furthermore, the position of small farmers and posseiros is the most prejudiced by such delays for several reasons. First, these groups lack access to the political decision-making process and official bureaucracies. They are thus less able to both exert and withstand legal and extra legal pressures. In addition, small farmers have few resources to finance legal representation and court appearances in distant state capitals. Similarly, few small farmers will own property elsewhere which can be used to secure bank credit until title disputes are resolved. These points reinforce the case for establishing the requisite institutional arrangements to expedite impartial settlement of title and posse claims.
159. As noted earlier, INCRA’s jurisdiction extends to areas within 150 km of international borders and 100 km of each side of federal highways situated in Amazonia Legal. The legislation creating the National Integration Program (PIN) in 1970 and Decree Law 1164 of 1971 following in the spirit of the Land Statute of 1964 give priority to colonization on lands in these two categories. In addition, INCRA has sole responsibility for land-titling in the Federal Territory of Rondonia.

**INCRA Program**

160. With the complex structure of property law in Brazil and the statutes governing its activities, as well as the often confused and conflicting nature of land tenure claims in the vast area for which it is responsible, INCRA’s land discrimination and titling procedures are extremely involved. In addition, there have been rapid changes in INCRA’s responsibilities since 1970. Previously, its principal functions involved the conduct of cadastral surveys, assessment of the rural land tax (Imposto Territorial Rural) and titling and colonization projects in border areas. The PIN program of 1970, the decision to undertake official settlement projects along federal highways in Amazonia Legal and the land reform provision of PROTERRA magnified these functions enormously. The political, legal and institutional problems raised by ambitious programs in such sensitive areas as land tenure and settlement as well as the difficulties of recruiting a large cadre of skilled personnel have also had an adverse effect on INCRA’s performance. As a result, there have been delays in resolving tenure disputes and in implementing titling procedures. Nevertheless, INCRA achieved a significantly higher rate of titling in the period 1974-76.

161. However, it appears that the scale and intensity of the issues raised by the policy decision to stimulate accelerated frontier settlement were only dimly perceived by the Government in the early 1970s. The simultaneous construction of frontier penetration roads in many areas has attracted migratory flows and settlement activity that, by and large, have overwhelmed the executive capacity of existing institutional structures. This assessment extends not only to discrimination and titling activities of INCRA but also rural extension services, rural credit, minimum price policies, agricultural marketing, health, education, housing and other social services. This emphasizes the need to reinforce the institutional framework in frontier areas. Concomitantly, policies are required which increase the opportunities for permanent settlement and employment in order to slow onward migration.

162. INCRA programs can be broadly classified as follows:

(a) Integrated Colonization Projects - these projects involve a substantial degree of public participation and direction as well as considerable investment in economic and social infrastructure.

(b) Directed Settlement (Assentamento Dirigido) - these projects are intended to settle newly penetrated areas rapidly with only minimum infrastructure provision. Agreements or convenios to transfer land to rural cooperatives which then organize settlement also can be included in this category.
(c) Public Auctions of Public Lands - these follow completion of the discrimination process (sorting out private from public holdings) on public lands. 1/ The size of holding auctioned, subject to federal legislation, will be determined by reference to the agricultural potential of the area in question.

(d) Private Colonization Projects - the decision to alienate areas exceeding 3,000 ha first must be approved by the Senate and the National Security Council. INCRA intends to impose rigorous criteria in the selection of colonization companies and will monitor project design and implementation closely to protect the interests of settlers.

(e) Land Tenure and Titling Projects (Projetos Fundiarios) - these projects seek to resolve land tenure and title questions by undertaking tenure "regularization," discrimination, alienation and titling. INCRA has six Public Land Discrimination Commissions in the Amazon and Central-West Regions. The entire area of the Federal Territory of Rondonia has been subdivided into four projetos fundiarios. Areas in the state of Mato Grosso which have been similarly designated include Caceres, Guapore, Cuiaba and international border zones. Accelerated implementation of projetos fundiarios represents one of the most immediate responses INCRA has conceived to deal with the problems generated by rapid in-migration and land invasion in frontier areas. Such projects and tenure "regularization" occupy a prominent role in the areas selected for POLAMAZONIA.

163. Despite the broad consensus that titling activity has lagged markedly behind the process of land occupation, quantitative estimates of the work outstanding are difficult to obtain. In broad terms, the area remaining to be discriminated by INCRA in the Central-West, including Rondonia, is 88.0 million ha. This task appears to be less overwhelming in Goias since discrimination has been completed for virtually the whole of the southern and southeastern areas of the state. In addition, INCRA officials estimate that 9.4 million ha are sub judice. The bulk of the discrimination and titling work now is concentrated in the areas north of the 13th parallel such as Araguaina in Amazonia Legal. The relatively rapid progress in titling in Goias in part is due to the activities of the Goias Agrarian Development Institute (IDAGO - Instituto de Desenvolvimento Agrario de Goias), an agency of the state government. IDAGO, through agreements with INCRA, has assisted in land discrimination, titling and public auctions in several northern areas of Goias.

164. The process of discrimination and titling is seriously delayed in the state of Mato Grosso. Thus, in the period 1971-74, INCRA has completed discrimination work on only 671,000 ha whereas the area outstanding is some

1/ Involving legal investigation and title deed searches in local land registries as well as topographical and cadastral surveys, land measurement and demarcation.
47.0 million ha. In the municipios of Caceres and Mato Grosso (Vila Bela) alone, with a combined area of roughly 10.0 million ha, it is estimated that only two-thirds of the land will be titled by 1985 at the present rate of progress. In order to accelerate titling, INCRA is seeking closer working relationships with state government agencies, notably CODEMAT. The backlog of titling work in the Territory of Rondonia is illustrated by the fact that only 6% of the total area of 24.3 million ha possesses definitive legal title. The remaining area is distributed as follows: forestry reserves (11.8%), Indian reserves (11.6%), lands with Indians in occupation (2%), official colonization projects (8.2%), in process of "regularization" (21.3%), areas undergoing preliminary survey (13.6%) and areas irregularly occupied (25.8%).

165. The proximate causes of titling delays include protracted judicial processes, inadequate financial resources and lack of well-qualified technical staff. The allocation of POLAMAZONIA funds will relieve INCRA's financial position, and presidential authority evidently has been granted for the revision of present salary scales. However, major inroads into the backlog of discriminatory and title work will not be achieved without sweeping structural changes to remove institutional constraints and expedite the legal and technical processes involved. Rapid and simplified titling procedures are indispensable for the effective implementation of strategies of land use and settlement in frontier areas.

Some Final Considerations

166. The wide spectrum of settlement patterns raises complex issues for policy formulation. Most significantly, policy choices must be made in the context of rapid unorganized settlement which restricts the scope for maneuver. Current agricultural frontier development programs (POLAMAZONIA and POLOCENTRO) and complementary support activities (rural credit and extension) are now concentrated on the development of large scale agricultural establishments, in the expectation that this will promote efficiency. The present pattern of land settlement, reinforced by ongoing government programs, is tending to reproduce the highly unequal distribution of land and rural incomes found in regions of earlier settlement.

167. The major question facing the Brazilian authorities is how to manage the process of frontier settlement to achieve a balance between efficiency and equity considerations. 1/ The answer to this question depends in

large part on the target groups chosen as intended beneficiaries of public programs and the constraints on policy execution. For example, institutional factors, particularly shortages of technical and managerial personnel, constitute a major constraint on the formulation and implementation of a regular flow of directed colonization projects. Yet such projects would be more likely to assist the poorer segments of the rural population.

However, even if institutional constraints do not permit a large scale directed settlement effort, there are other policy options which could support operations of small and medium-size farms. This might involve rapid, simplified titling procedures and minimum infrastructure provision, possible on an "effective demand" basis, in areas of spontaneous pioneer settlement. This approach embodies elements from INCRA's programs for projetos fundiarios and directed settlement but would place overriding emphasis on swift execution. Careful selection of public lands to be sold, whether by open auction or directly to private colonization companies, and control of sales criteria, such as parcel size and credit terms, would encourage land use along lines of agricultural comparative advantage. For example, land with soil characteristics and location which favor permanent settlement by small farmers and homesteaders could be reserved for this purpose. Conditions in other areas may make it advisable to foster large-scale farming or livestock operations. In short, although frontier agricultural development will involve various settlement approaches, the critical task is to design policy instruments and an institutional framework to promote land use patterns which yield the greatest social and economic benefits.