CURRENCY EQUIVALENTS

Prior to July 1, 1983 US$1.00 = Le 1.24
After July 1, 1983 US$1.00 = Le 2.50

WEIGHTS AND MEASURES

1 metric ton = 0.98 long ton = 37 bushels
1 hectare (ha) = 2.47 acres
1 kilometer (km) = 0.62 mile

ABBREVIATIONS

ACRE Adaptive Crop Research and Extension
ADB African Development Bank
BDAEA Banque Arabe pour Developpement Economique en Afrique
DOPC Daru Oil Palm Company
EEC European Economic Community
EPD Economic Planning Department
FBC Fourah Bay College
FFC Farmers Finance Company
GOSL Government of Sierra Leone
GMOPC Gambia Mattru Oil Palm Company
IADP Integrated Agricultural Development Project
IDA International Development Association
IFAD International Fund for Agricultural Development
IMF International Monetary Fund
LRSP Land Resources Survey Project
LWRD Land and Water Resources Department
MAP Ministry of Agriculture and Forestry
MNR Ministry of Natural Resources
NUC Njala University College
NAPCO National Produce Company
NARCC National Agricultural Research Coordinating Council
ODA Overseas Development Administration
PEMSU Planning, Evaluation, Monitoring and Services Unit
PARCC Provincial Agricultural Research Coordinating Council
RRRS Rokupr Rice Research Station
SLPMB Sierra Leone Produce Marketing Board
SMU Services Management Unit

FISCAL YEAR

July 1 - June 30
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MAPS

IBRD 17143 Physical and Agro-climatic Areas
IBRD 14746R - Integrated Agricultural Development Projects
IBRD 17145 - Tentative Ecological Sub-areas

Supporting Papers

1. Agriculture and the Public Economy
2. Land Resources and Issues
3. Institutional Organization
4. Cropping Systems: Food crops
5. Technological Alternatives for Rice Farming
6. Cropping Systems: Tree Crops
Preface

This report is a result of a joint effort by the Bank and IFAD, with support from the Government of Sierra Leone. In October 1982, a Bank/IFAD mission visited Sierra Leone to examine further three main sets of constraints relating to the system of incentives, the technological framework and the institutional structure which had been identified during the course of project preparation and implementation as major factors limiting the performance of the agricultural sector.

The composition of the mission was as follows: from the Bank - Vijaya Mackrandilal (Economist/Mission Leader), Brian Gray (Senior Tree Crops Specialist), Don Drayton (Agriculturalist - foodcrops), François Falloux (Economist - land issues), Jean Curling (Research Assistant - farm budgets and DRCs), Laurence Skromme (Consultant - animal traction and mechanization); and from IFAD - Hadi Shams (Economist), Khalil Hamuddah (Consultant - farmer organizations), David Gee Clough (Consultant Agricultural Engineer), Olu Williams (Consultant (local) Economist). The mission was also supported by Rashid Faruqee, Economist, WA1B; and John Wall, Senior Economist, WA1.

In addition to providing assistance from the staff of the Ministry of Agriculture and Forestry, the Government also supported the mission by financing two consultants (under the IDA Technical Assistance Credit 970-SL), Jerry Silverman on institutional matters and Jack Maycock on oil palm processing and refining. In addition, considerable assistance was provided to the mission by Government, particularly from PEMSU, the planning unit of the Ministry of Agriculture and Forestry. Their collaboration is much appreciated.

A draft version of this report was discussed with the Government in October 1983 by a mission comprising Rashid Faruqee, Economist; John English, Senior Economist (Bank); and Hadi Shams (IFAD).

The report is being presented at a time of major change in the agricultural sector institutions. Many of the proposals of this report have been incorporated into an Agricultural Sector Support Project, to be negotiated in March 1984. Linked to this project, Government has decided to merge the Ministries of Agriculture and Forestry (MAF) and of Natural Resources (MNR). This merger is now being effected.

A number of subsectoral studies were prepared as part of this report. These include papers on food crops, tree crops, land issues, institutional issues. These supporting papers are listed in the table of contents and are available upon request.
1. The economy of Sierra Leone is in a serious situation: output in the two main sectors -- agriculture and mining -- is declining and per capita real incomes are falling. In the agricultural sector, the decline has been about 3.7 percent per annum for the past two years, following almost 4% annual growth in the late seventies. In the mining sector, the decline began in the mid-1970s and stems from the closing of the iron ore mines and falling alluvial diamond production. Agriculture is key to a reversal of this situation, being the only potential source of growth and recovery of the economy in the medium term.

2. While agriculture accounts for 65% of total employment, it contributes only 30% of GDP. Production is mainly for subsistence, with less than 40% of total production entering the monetized economy. Cash crops come mostly from the Eastern and Southern parts of the country where climatic conditions have led to the development of tree crops for export; in the Northern Province, conditions are less favorable as the dry season becomes longer and the cropping system is mainly shifting cultivation for subsistence. This has resulted in wide regional variations in per capita incomes: in 1981, average incomes were Le 150 (US$127) in the East, compared with Le 50 (US$42) in the North. Nearly all agricultural production is accounted for by smallholders with farms ranging from 2 hectares in the Eastern Province to 1/2 hectare in the Western Area near Freetown.

3. Official exports of the main cash crops have been fluctuating considerably: coffee from a peak of 11,000 tons in 1979/80 to 7,200 in 1980/81 to 10,000 in 1981/82; and cocoa from 10,400 tons in 1979/80 to 8,100 in 1980/81 to 8,700 in 1981/82. Production of rice, the main staple, currently estimated at 310,000 tons of milled rice has not kept pace with population growth and rice imports have risen from about 5-10% of total requirements in the seventies to nearly 20% in the early eighties. This overall performance of the agriculture sector is below its recognized potential; yields are well below attainable levels, less than 10% of the potentially arable swamplands are cultivated, and 50% of the tree crop potential remains untouched.

4. The slow growth of agricultural output during the seventies and the sector's worsening record in recent years can be ascribed, in part, to the macroeconomic policies pursued by the Government. In its first national development plan 1974/75 - 78/79, the Government had assigned high priority to agricultural development as being essential for long-term economic growth equitably distributed across regions and income classes. The main instrument of the development strategy was the Integrated Agricultural Development Project (IADP). However, investment in the agricultural sector has been comparatively low and recurrent expenditures have been inappropriately allocated, the major part going to wages and salaries of daily paid workers whose productivity is not apparent. The proposed Second Five-Year National Development Plan devotes more attention to agriculture; the emphasis in all sectors
is on expediting successful completion of ongoing projects and implementing new ones with quick-yielding results. Of the total proposed public sector investment of Le 1,065 million (US$426 million at official exchange rates), the major part, 26% - Le 275 million (US$110 million) - is allocated to agriculture. The implementation of the entire plan and especially of the agricultural part will depend almost entirely upon external financing since domestic savings are expected to be only about 3% of GDP. The feasibility of the plan in relation to the absorptive capacity or availability of financing must await completion and further analyses of the sectoral programs. The Government is already experiencing financing problems in meeting its recurrent obligations (for imported inputs) in the agriculture sector, as well as its local currency contributions to the ongoing development projects.

5. **Incentives.** More importantly, Government's policies with respect to the incentive framework have had a serious effect on agricultural production. The overvalued leone imposed low producer prices for the export crops as well for rice, since imports at the low rate of exchange depressed the domestic urban market price. In the case of the main export crops -- coffee and cocoa -- these prices were further lowered because of the 30% export tax. The devaluation of July 1983 has assisted in the correction of these prices. With the exchange rate adjustment, most rice producing technologies have a comparative advantage not only for subsistence consumption, but also for supplying the Freetown market (at 1983 border prices). While this advantage is very small for the traditional technologies, they will continue to be economical for rural subsistence consumption. At the 2.5 exchange rate, there is strong comparative advantage in producing coffee and a lesser, though still substantial, one for cocoa. If these comparative advantages are to be exploited fully, the incentives would have to be improved further through appropriate exchange rate adjustments and a flexible approach towards taxation of these crops. The problem of low producer prices has been compounded by the delays in Government-controlled price adjustment mechanisms. As a result, signals are sent when it is too late for producer responses and often cause disruptions in the markets and lead to windfall gains to traders/moneylenders. The operations of the existing inter-Ministerial Pricing Committee need to be formalized, with strict adherence to the proposed schedule for price announcements. The analytical foundations of the price levels should also be improved to include other factors, particularly farm- and market-level analysis, and the implications of flexible taxation policies in response to external prices etc.

6. **Inefficiencies in the marketing systems help to depress prices even further**, and Government lacks the administrative and infrastructural means to intervene efficiently in direct procurement. Past experiences in Sierra Leone have clearly indicated that large-scale public sector participation in rice marketing is extremely difficult, if not impossible, to manage. However, some intervention is necessary by the Sierra Leone Produce Marketing Board (SLPMB) but it should not attempt to purchase more than a limited share of production. Its current program of expanding its Freetown rice storage capacity by 25,000 tons, and its rice milling and storage capacity with an additional 5 small mills in the rural areas, appears appropriate. However, the SLPMB can play a greater role in marketing by expanding its current program of assistance to village organizations in building their own storage centers, and in
coordinating the operations of its trading arm, NAPCO, with the IADPs in assisting farmer groups in their marketing of both rice and export crops. Farmer group involvement in marketing is proposed as an alternative to increased government participation in providing some competition to the presently oligopolistic system of traders, which should reduce the imperfections that exist and lead to higher prices to producers, the majority of whom are smallholders.

7. Rice marketing and pricing problems are also created by poor timing of importations, public or private, which destabilizes the market. This problem is magnified by lack of an adequate basis for early forecasts of production to enable at least public purchases to be increased or decreased so as to offset forecast declines or increases respectively in domestic production. Improving the relevant data base and forecasting system should be a priority for Government.

8. Technology. Improvements in the incentive structure would complement efforts to improve the technological framework. Technological limitations include inefficient agronomic practices, inadequate water control methods, and almost complete dependence on human labor for agricultural energy. In the past, with abundant land, these factors were not major constraints under the upland bush fallow system; however, population growth and socio-economic pressures (increased demand for higher cash incomes, etc.) are pushing the system to its ecological limits. The alternative, swampland cultivation, is constrained by labor shortages and the greater risk of its mono-cropping system as compared with the mixed upland cropping, a highly risk-diversified system, developed over decades. The recommendations in the Main Report and Supporting Papers include various methods of improved agronomic practices (for both upland and swampland systems), proposals for labor-saving technologies in cultivation (work oxen, power tillers, etc.), harvesting and crop processing. The proposals on improved water-control designs and research into cropping systems for upland/swampland complexes seek to address both the labor and risk constraints.

9. Institutions. The organizational problems of the Ministry of Agriculture and Forestry (MAF) and the Ministry of Natural Resources (MNR) constitute some of the most pressing issues in the sector at present. 1/ These problems include poor management, as reflected in the inappropriate priorities and allocation of funds; inadequate extension services, research and training; and fragmentation of the organizational structure. As a result, the Ministries are unable to provide adequate extension and other support services to farmers. In order to circumvent these problems of the Ministries, foreign donors, including the Bank, have assisted in the establishment of semi-autonomous Integrated Agricultural Development Projects (IADPs) to provide efficient services to farmers. Of the Bank/IFAD-assisted IADPs, the completed ones have been fairly successful in meeting their physical targets (though production impact and institutional development have been below expectations); and the ongoing ones are progressing satisfactorily (though constrained by

1/ Government has decided to merge these two Ministries.
delays in Government contributions). These IADPs are costly and were set up for specific objectives within a limited time frame; at present a major organizational problem is how to integrate them into the normal government structure and maintain their achievements even after foreign assistance ceases. Within the context of these problems and the wider context of national constraints and objectives, a reorganization strategy of decentralization and increased participation introduced over three phases, is proposed. Policies within the broad strategy include proposals on integration of the IADPs, improvements in management and coordination, financial reform, improved incentives and farmer participation. The promotion of farmer groups is proposed as a potential means of improving the efficiency of extension, marketing and credit services to large numbers of scattered smallholder farmers including women farmers, who have often been excluded in the past.

10. **Recommendations.** The analysis of the constraints and recommendations resulting from the Sector Review indicate a need for a major restructuring of these three key aspects of the sector -- the system of incentives, the technological base and the institutional services. However, the pervasive nature of some of the constraints (especially the institutional and technological) and the data limitations dictate a cautious approach to any restructuring exercise. Therefore, restructuring should be a gradual process. The focus in the short-to medium-term strategy should be on the most efficient (in terms of time and available resources) means of introducing the proposed improvements in incentives, technology and services to increase rice and oil palm production to substitute for imports and to stem the decline in the sales of coffee and cocoa to the SLPMB. In the longer term, emphasis should be shifted to implementing major structural changes in the institutional and technological framework and diversifying the production base (on the basis of research results on the food crops, cropping systems, etc.). The recommended strategy aims not only at accelerating growth in production but also at affecting a more equitable and sustainable distribution of income by removing the urban biases in pricing and employment policies and by improving productive capacity (through technological improvements) of the predominantly smallholder agricultural sector. The institutional reform supported by increased emphasis on farmer organizations would improve the quality and coverage of basic services -- extension and research -- to smallholders.

11. In terms of the major crops, the strategy should be as follows:

(a) for rice: for the short-term maintaining price incentives; privatization and improvement of mechanical operations in the riverain grasslands; and increasing reliability of supply of improved seeds for uplands; for the medium-term promotion of production in valley swamps through improved extension and research; stimulate small- and medium-scale production through improved incentives, agronomic practices, and technology for cultivation and water-control;

(b) for coffee and cocoa: improve prices to encourage better husbandry and rehabilitation, strengthen the research and planting program in the Eastern Project; and establish a seed garden and nurseries for the ongoing and proposed smallholder programs; and
(c) for oil palm: strengthen the managerial and technical capabilities of the parastatal companies through private sector participation (in equity and management) and channel this commercial production to meet industrial demand for soap and margarine manufacturing; introduce a Village Oil Palm Program, using locally produced hand-presses, to meet rural consumption demand, which would avoid the transportation and marketing problems of the two oil palm companies as well as conform to local taste preference.

12. The implications for external assistance are that while funding of the current IADPs will continue to be needed to support regional services, additional assistance in the near future should be utilized primarily to address the major constraints within a sectoral framework. Therefore, projects/programs should be designed to restructure the technological and institutional frameworks on a countrywide basis along the lines proposed; and productive investments should be focused on the programs identified for rice, oil palm, and coffee -- the major sources of growth in the short- to medium-term. In addition, a formal Donor Working Group should be established as a first step towards the coordination of external assistance. Coordination is required at the level of investment policy formulation and assessment, and at the level of implementation and resolution of problems that arise during the process. A major objective should be the negotiation of a five-year plan of External Assistance to guide the donors and Government in their investment decisions.

13. The strategy for the Bank should be to continue existing operations, but with some amount of redesigning, to take into account the proposals on organizational restructuring and technological improvements. Within the context of the sectoral approach recommended above, the Bank and IFAD should also consider broadening the scope of its operations in the agricultural sector to reinforce their current IADP operations. Such support should be provided for sectoral adjustment support as well as funding for the critical programs for technological improvements and institutional reform. Sectoral adjustment assistance is needed to support the adjustment process following the recent policy changes, such as the currency devaluation and producer price increases. The assistance should be closely linked to further policy reform, such as improvements in the allocation of budget and foreign exchange resources to the sector, and to the maintenance of an incentive structure for agricultural production.
I. INTRODUCTION

A. Purpose and Focus of the Review

1.01 As Sierra Leone enters the mid-1980s, it faces a myriad of internal and external problems arising mainly from exogenous factors such as falling export prices and slow internal adjustments in exchange rate, monetary and fiscal policies. The major problem is the performance of the economy - overall growth has dropped to the point where per capita real income is declining. An associated problem is a worsening balance of payments situation resulting from the continuation of expansionary internal policies while export prices and production levels have been declining. In the agricultural sector, the value of production has been declining, and depressed rural incomes have led to massive rural-urban migration, thereby exacerbating problems of congestion, strain on public services, social unrest and growing seasonal shortages of rural labor.

1.02 The problems in the agricultural sector have occurred despite ecological conditions generally favorable for agricultural production, an emerging Governmental support for the sector as evidenced by large recent increases in the size and budget of the institutions serving agriculture, and substantial support, both financial and technical, by foreign donors and international institutions. It is time for a re-examination of the agricultural sector and the policies, institutions and constraints - technological, informational, social, and ecological - inhibiting its performance. Sierra Leonean agriculture cannot continue in its stagnation; further decline will have far-reaching and potentially disastrous impacts.

1.03 The problems pose formidable tasks for the Sierra Leone Government and its international supporters, but they must be addressed and tackled now. This review, although relying on a limited data base, hopefully represents a start in the right direction. It attempts to analyze the major constraints on the performance of the agricultural sector, assess the potential for development, and contribute towards the formulation of strategy covering both Government policies and external donor involvement. In view of the time and data limitations, the review focuses on the main issues which have been identified during the course of project implementation and sectoral analysis. These issues relate to three major aspects of the sector:

(i) the incentive framework - policies on prices, taxes, subsidies and marketing that are inimical to the promotion of agricultural production;

(ii) the technological framework - including inadequate agronomic practices; poor water control; and low level of technology; and

(iii) the institutional framework - inefficient organization of services to the sector; lack of organization of farmers to maximize efficiency in supply of these services; unsatisfactory data collection and planning; and lack of security in land tenure arrangements.
B. Economic Background 1/

1.04 Sierra Leone has a total area of 72,000 km², of which about 75% is cultivable and a population of 3.3 million growing presently at a 2.7% per annum. It is in the low-income category of the countries of Sub-Saharan Africa. In the last few years real per capita incomes have declined by nearly 2 percent per annum. The average per capita income was about US$250 in 1979 and unevenly distributed across sectors and regions. The rural population (75% of the total) have per capita incomes far below the national average; it is estimated that about 65% of them exist below the absolute poverty level of US$75. 2/ The economic structure is characterized by two largely contrasting sectors: traditional agriculture, employing about 65% of the work force but accounting for only 30-35% of GDP and of export earnings; and the modern mining sector accounting for about 10% of GDP and 60-70% of export earnings. After growing vigorously in the early 1970s, the economy has virtually stagnated in recent years. The major factors were a fall in diamond production, the cessation of iron ore mining and a fall in agricultural exports in the last two years. In the meanwhile, as domestic demand has been at a relatively high level, the rate of inflation has accelerated (the annual increase in the CPI for Freetown rose from 14% in FY81 to 22% in FY82); and the balance of payments has come under increasing pressure. The estimated current account deficit for FY82 was Le 162 million (US$ 147 million at 1982 exchange rates) nearly 12% of GDP (at current market prices).

1.05 The recovery of the economy depends on the agricultural sector, since in the medium term it is the only foreseeable engine of growth. However, the performance of the agricultural sector has been below its recognized potential and in recent years the value of output has actually been falling. The value of total agricultural production (in constant prices) increased only at 1.1 percent annually during FY 71-FY75 and slightly increased to about 2.2 percent during FY76-FY80. The relatively faster rate of growth of agricultural output in the latter part of 70's was from the expansion in cultivated area in response to some increase in producer prices. The overall growth rate of agricultural output throughout the seventies was, however, significantly lower than the population growth rate. Recently, the situation has become worse: during the three years FY80-FY83, the value of agricultural production actually declined at an annual rate of 3.7 percent. The decline of agriculture is less than mining (value of total mining output just over 10 percent a year during the same period), but more than the manufacturing sector (which declined at 2.1 percent a year during the same period). The output decline in the productive sectors also affected the performance of the services sector in recent years.

1/ Further details on the macroeconomic setting, agricultural performance, etc. are in Supporting Paper 1.

2/ Ibid., paras 1.15 - 1.20 for further information on income distribution and nutrition.
1.06 Other important indications of declining production in agriculture in recent times include:

- declines of about 40% and 5% respectively between 1979/80 and 1980/81 in the sales of coffee and cocoa to the SLPMB, mainly as a result of lower producer prices (though only a part of this is a real decline in output, since some production is smuggled across the borders); and

- an increase in rice imports from 50,000 tons in 1980/81 to 95,000 tons in 1982/83, representing an increase to nearly 20% of total domestic requirements.

1.07 Declining production in agriculture has had an adverse affect on several of the macroeconomic accounts. The adverse affect on balance of payments is serious. On the one hand, the value of agricultural exports has been declining, partly from falling prices of coffee and cocoa in the world market and partly because of declining output of these commodities, as noted above. On the other hand, rice imports have gone up substantially in recent years. The combined import bill for food items increased from Le 18 million in FY72 to Le 98 million by FY80 and to Le 112 million in FY82. Since 1972, the trade balance for agricultural commodities has registered an increasing deficit except for the period 1977/79. The deficit reached a peak of Le 60 million in 1980, which is about 40% of the total deficit in the current account of the balance of payments and has only declined marginally since that year. Agricultural exports are also an important source of government revenues through export taxes (30-35% of f.o.b prices) on coffee and cocoa. Proceeds from export duties on agricultural commodities have declined from 14% of total government revenue in 1977/78 to 5% in 1981/82.

C. Government Strategy and Policies in the Sector 1/

1.08 The slow growth of agricultural output during the 70s and the sector's worsening record in recent years can be ascribed in significant part to the macroeconomic policies pursued by the Government. In its first national development plan 1974/75 - 78/79, the Government had assigned high priority to agricultural development as being essential for long-term economic growth equitably distributed across regions and income classes. The main instrument of the development strategy was the Integrated Agricultural Development Project (IADP) approach (para 1.10). However, investment in the agricultural sector has been comparatively low -- around 10 percent of the development budget went to the sector during the 70s. Only in the last two years (FY81 and 82), has the proportion of the development budget allocated to the sector approached 25 percent. Recurrent expenditures in the sector have also been low and inappropriately allocated. 2/ Prior to FY81 the combined annual development and current expenditures were below annual export tax

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1/ Further discussion in Supporting Paper 1.

2/ See Chapter V and Supporting Paper 3, para 2.16.
receipts from agriculture. In the proposed Second Five Year National Development Plan more emphasis is devoted to agriculture. The preliminary outline indicates that the Government's main objective is to reverse the present trend of persistent economic stagnation and strengthen the productive base of the economy. This objective would be achieved through sectoral policies that would expedite successful completion of ongoing investment projects and the implementation of new ones with quick-yielding results. The plan, which has not yet been finally approved by the Government, envisages public and private investments of Le 1,804 million (US$1,455 million at 1982 exchange rates), equivalent to 24 percent of the projected GDP over the five year period. Of this total, public sector investment is expected to account for Le 1,065 million (US$860 million), the major part of which is allocated to agriculture (26%) electricity (24%) --mainly for the proposed Bumbuna Hydroelectric Project and transport and communications (24%). The individual sectoral programs have not yet been completed, nor the financing arrangements specified. Since domestic savings are projected by the planners to be minimal (about 3% of GDP), the implementation of the plan will depend upon external financing. While these sectoral allocations appear appropriate, given the priorities and constraints, full assessment of the feasibility of the plan in relation to the absorptive capacity or availability of financing must await further analyses of the sectoral programs. The Government is already experiencing financing problems in meeting its obligations with respect to the recurrent costs of crucial imported inputs such as fertilizer, spare parts and fuel, as well as its local currency contributions to the ongoing development projects in the sector.

1.09 More importantly, past pricing policies of the Government, (mainly because of the exchange rate policy), have had a serious effect on agricultural production. The overvalued leone (up to December 1982) imposed low producer prices. In case of the main export crops -- coffee and cocoa -- the prices were further lowered because of the 30% export tax. In the case of rice, imports at an artificially lower value of foreign exchange depressed the domestic urban market price. These policies of the Government are discussed further in relation to the overall incentive structure in Chapter 3.

**D. Bank and IFAD Operations in the Sector**

1.10 Bank Group and IFAD operations in the agricultural sector to date have been in support of the Government's strategy of emphasis on IADPs to foster the development of the sector. The Bank/IDA Group contributed to the financing of two IADPs through a phased approach under four loans/credits (see Map 14746). The Eastern IADP is in its third phase (Cr. 323 phase I; Cr. 568/Ln. 1138 phase II; Cr. 1094 Phase III), while the Northern is in its second (Cr. 568/Ln. 1138 phase I; Cr. 1128 phase II). IFAD is the sole external financer of the Magbosi IADP (for which the Bank is the Co-operating Institution), and a co-finance of the Northern IADP II. The completed projects have been fairly successful in meeting their physical crop development and civil work targets. The crop programs have contributed to increased food production - mainly rice and palm oil; and the cocoa program is now coming into production. The projects have been successful in creating an
awareness among farmers of the benefits of improved practices, as reflected in the growing demand for oil palm, cocoa and coffee seedlings in the Eastern Area and for improved rice seeds and fertilizers in the Northern and Magbosi Areas. However, the overall impact has been somewhat below expectations. Yield increases have not been as high as originally envisaged, higher yielding swamp farming has not been integrated into the traditional farming systems which are concentrated on the uplands. The explanatory factors include technical weaknesses due to inadequate research, as well as organizational weaknesses as reflected in the quality of the extension services. The institution-building efforts have had mixed results. Positive results were achieved in project management, engineering and financial control mainly with the help of foreign technical expertise. However, the technical assistance for planning, monitoring and evaluation has yet to prove effective. In recognition of the institutional and other weaknesses which have emerged during the implementation of the IADPs and those which could not be resolved within their scope, the Bank assisted the Government in the preparation of a project (Ag Dev V) to address these problems. In the area of rural credit, the Bank financed a study and is engaged in ongoing discussions with the Government on future development and policy. In the forestry sector, a joint FAO/Bank mission in June 1981 identified a project, which has since been prepared by FAO/CP; the project makes proposals on the reorganizational aspects of the Forestry Department. In the area of pricing and marketing, RMWA has supervised a study which examined some of the pricing and marketing problems.

1.11 The Bank's emphasis in the past on a project rather than sectoral approach had been justified on the basis of the need to concentrate scarce resources on increasing production through the IADPs. While the IADPs have certainly contributed to the transfer of substantial resources to the regions, and have been major sources of extension, credit and input supply services, they still remain isolated operations, dependent on foreign expertise and Bank supervision. During the preparation of Ag. Dev. V it was confirmed that wider institutional improvements and incentive policies were required to maintain and expand the achievements of IADPs and therefore more thorough sectoral analysis was necessary. This review constitutes the results of such analysis.

E. Other External Assistance

1.12 There is considerable involvement in the sector by other donors, mainly in the financing of the IADPs (Map 14746). The African Development Bank (ADB) is the sole external financier of the Moyamba IADP and the Gambia Mattru Oil Palm Project, it is a cofinancer of the Northern IADP and the Torma Bum Rice Project (para 4.20). The European Economic Community is currently financing the Koinudugu (IADP) in its second phase and is likely to finance the Kambia - Port Loko IADP, now in its final stages of preparation. German Technical Aid (GTZ) is involved in the financing of the Bo - Pujehun IADP. The UNDP has provided Technical Assistance to the Northern IADP, central services of MAF - for planning, monitoring and evaluation, data collection and the Land Resources Survey Project (para 2.06). Other external financiers on a smaller scale include Banque Arabe pour Developpement Economique en Afrique
(BADEA), the Government of the Netherlands, Britain, Japan, and the People’s Republic of China. In addition, a number of non-governmental organizations are active in Sierra Leone, e.g. Plan International, CARE and other organizations linked to religious orders.

II. THE STRUCTURE AND POTENTIAL OF THE AGRICULTURAL SECTOR

A. The Resource Base

(1) The Farming Population

2.01 According to the 1974 National Census, 80% of the total population were directly dependent on agriculture for their livelihood. With a national population growth currently at 2.7% and urban and rural rates of 5.7% and 1.7% respectively, it is estimated that this proportion is now about 75%. In the 1970/71 Agricultural Census, it was estimated that the farming population was comprised of approximately 286,000 farming families and an additional 20,000 cattle-herding families, mainly semi-nomadic Foulahs. In 1982, it was estimated that the number of farming families had increased to 350,000. Farming families are predominantly smallholders, with nearly two-thirds of all farms below 1.5 hectares.

2.02 The age distribution of farmholders is skewed as a result of migration to the urban and mining areas. In 1970/71, more than 57 percent of all farmholders were above 45 years of age and only 1.4 percent were below 25 years. Indications are that with migration to the urban centers and diamond fields, this age distribution has worsened, thereby exacerbating the labor shortage.

2.03 At present there is no large landless labor force in Sierra Leone, given the relative availability of land and the flexibility in the land tenure arrangements in the past, as discussed further in paras 2.39 - 2.40. The major source of labor is from within the household; when this is insufficient, recourse is made to the system of exchange labor, whereby the younger members of the households form work groups to complete the major tasks on a reciprocal basis. In the past, the elderly household heads exercised control over these work groups and had easy access to their labor; however, the system is changing and there is an increasing demand for cash payment by the members. In addition to these exchange groups, there are a limited number of more organized groups which are available for hire, again comprising mostly of younger members of farming households, who are trying to earn enough cash to establish their own households.

2.04 The Role of Women in the Sector. Women play an important role in the sector. In the on-farm production process they are usually responsible for tasks such as sowing, transplanting, weeding, and processing and they also assist in harvesting. The retail trade in food crops and fish is also female-dominated. Women are also farmers in their own rights, either as household heads or as senior wives in polygamous households.
2.05 There are a number of factors which limit the potential of women's contribution to the development of the sector. Within the context of local customs, the existing organization of extension and the prequalifications for institutional credit, most of them are excluded from receiving the full benefits of these services and, therefore, special actions are necessary to address these problems. An emerging constraint is the availability of land for women to cultivate. In the past, their major source of land had been plots which had been cleared by the men and were in the second or third year of the fallow cycle. With the increasing pressures on the land and shortages of labor for clearing, these plots are being increasingly retained as the family farm. Another problem, as discussed further in Chapter IV, is that the introduction of improved techniques has a different impact on the distribution of labor within the household.

(ii) Land and Climatic Resources 1/

2.06 Approximately 75% of the total geographic area of the country is arable, i.e., about 5.36 million ha from a total of 7.23 million ha. This cultivable land is comprised of 4.3 million ha (80%) of uplands of relatively low fertility and 1.06 million ha (20%) of more fertile land, mainly swamps with considerable production potential, under conditions of good water control and agronomic techniques. The swamplands are comprised of inland valley swamps--630,000 hectares; riverain grasslands--100,000 hectares; bolliland2/--120,000 hectares; and mangrove swamps--200,000 hectares (see Annex 1 Table 2).

2.07 Land suitability for particular cropping systems in Sierra Leone is dependent on conditions of climate and land capability (soils and topography). Total precipitation is high at 2200 - 3000 mm over much of the country. The most important climatic factor is not total precipitation, it is the distribution of rainfall over the year, and the consequent length of the growing season, which becomes shorter as one proceeds north in the country. The major soil and topographical factors which limit agricultural development are the poor drainage of the low lying coastal areas, the hilly topography of the northern and eastern areas, and the often shallow upland soils.

2.08 Based on geomorphology, topography and soils, four main regions are defined (Map 17143): (i) the coastal plains, (ii) the interior plains, (iii) the plateau, (iv) the hills and mountains. Using an alternative system of classification based on agro-climatic data, four homogeneous regions can be defined: (i) the coastal plains, (ii) the rain forest area, (iii) the transitional rain forest area, (iv) the savanna woodland area. Finally, by combining these physical and agro-climatic factors with other factors such as demography, land use and administrative boundaries, nine ecological sub-areas

1/ Data on physical and agro-climatic data are from the FAO/UNDP Land Resources Project (LRSP) implemented between 1975-80. For further details see Supporting Paper 2.

2/ These are large saucer-shaped depressions with acidic soils and subject to complex flooding patterns.
### Table 2.1

**Sierra Leone**

**Ecological Sub-areas**

<table>
<thead>
<tr>
<th>Province/Location</th>
<th>Growing Period (Days)</th>
<th>Rainfall (mm)</th>
<th>Physical Characteristics</th>
<th>Population Density/ha</th>
<th>Agricultural Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Western Area</td>
<td>300</td>
<td>3000</td>
<td>- largely mountainous &amp; hilly</td>
<td>Basically Urban</td>
<td>- vegetables and fruit growing</td>
</tr>
<tr>
<td>2. Northern (north-western coastal plains)</td>
<td>260</td>
<td>3000</td>
<td>- Beach terrace soils - Mangrove swamps</td>
<td>30-100</td>
<td>- beach soils, low fertility - swamp rice but limited by salinity - high population but limited potential. - vegetables and small rumi-nants for urban markets.</td>
</tr>
<tr>
<td>3. Northern (central) (northern interior plains)</td>
<td>255</td>
<td>2600</td>
<td>- plains and bollands</td>
<td>30(+)(+)</td>
<td>- rice in swamps and bollands - swamps have potential for double cropping. - bollands limited by acidity and difficult water control. - fruit trees (citrus &amp; mango) in the uplands - in the north, possibility of mixed farming with animal traction.</td>
</tr>
<tr>
<td>4. Northern (far north) Savanna Mountains and plateau and coincident with Koinadugu project</td>
<td>255</td>
<td>2200</td>
<td>- uplands soils shallow and gravelly</td>
<td>10-20 Increasing</td>
<td>- swamps very suitable for rice. - mixed farming with animal traction should be promoted with priority on rice.</td>
</tr>
<tr>
<td>5. Northern (eastern)</td>
<td>270-300</td>
<td>2500</td>
<td>- similar to sub-area 4</td>
<td></td>
<td>- focus on swamp development. - better soils on uplands suited to cocoa and coffee.</td>
</tr>
<tr>
<td>6. Eastern (northern Eastern Province)</td>
<td>300</td>
<td>2500</td>
<td>- rain forest mountains and plateaux</td>
<td>30-100</td>
<td>- intensive swamp development. - tree crops in uplands.</td>
</tr>
<tr>
<td>8. Southern (transitional interior plains)</td>
<td>270-300</td>
<td>2800</td>
<td>- uplands and swamps</td>
<td>30-60</td>
<td>- focus on swamp development. - tree crops in uplands.</td>
</tr>
<tr>
<td>9. Southern (southern coastal plains)</td>
<td>270</td>
<td>3000</td>
<td>- beach terrace soils</td>
<td>30(-)</td>
<td>- beach soils low fertility - mangrove swamps limited by fertility. - rivertain plains have potential for rice, but require careful hydrologic study.</td>
</tr>
</tbody>
</table>

Source: Mission surveys and various reports.
have been tentatively defined. One sub-area covers the western area, four the northern, two the eastern and two the southern provinces (see Map 17145). These are described briefly in Table 2.1. The main features of this classification are the shorter growing period of the north, the concentration of current and potential tree crop activities in the east and, to a lesser extent, the south; the riverain grasslands in the south and their potential for rice; the widespread occurrence of inland swamps throughout the country, with particular potential in the east.

B. The Crop Production Structure

(i) Cropping Systems

2.09 An estimated 0.5-0.6 million hectares is under cultivation each year, including 0.1 million hectares under permanent crops largely in the Eastern Province; the remaining 0.4 million ha is planted with annual crops in the uplands (0.3 million ha) under a bush fallow system, and in the swamps (0.1 million ha). Rotational bush fallow with mixed cropping is the predominant farming system. At the beginning of each annual farming season, a different piece of land is cleared, burned, and planted with rice (on about 75% of the area) and a mixture of vegetables and pulses mostly in mixed stands, though a few pure stands are found. Generally (about 65% of the cases), the land is cropped again in the second year; according to the LRSP survey, the second crop might be rice again in 30% of the cases; cassava 24%; groundnuts 15%; grains, pulses etc. 31%. The land is then allowed to revert to bush to be used again for cultivation 5-10 years later.

2.10 The distribution of land by crop is shown in Annex 1, Table 1—about 80% of the total cropped area is devoted to domestically consumed food crops, with the two major export crops, coffee and cocoa, accounting for the remaining area.

(ii) Food Crops 1/

2.11 Rice. The food crop situation of Sierra Leone is dominated by the staple food, rice. Over 80% of the country's farmers grow this crop, which supplies more than 50% of the calorific intake of the country. Rice production is carried out in two distinct ecologies, upland and swamp—with upland cultivation accounting for about 55% of the total annual production, currently estimated at around 550,000 tons of paddy. Production growth rates of between 1 and 2% have not kept pace with the growth in demand. There has been a long history of concern over the development of the rice industry in Sierra Leone; and, while there have been some notable successes, the rate of development has been erratic, generally lagging behind demand and Government's aspirations, and representing the under-exploitation of a recognized potential. Yields continue to be considerably below potential and even though improvements in

1/ Further details and specific developmental recommendations are presented in Supporting Paper 4 and 5.
technology exist for each rice growing ecology, it is evident that a widespread adoption of such improved techniques has not taken place. The major explanatory factors have been attributed to the sectoral constraints in the incentive, technological and institutional framework, which are discussed further in Chapters III, IV and V. As a result of its importance, most farming activities revolve around the growing of rice, and any program of improvements or diversification of the farming systems must take this into account. It is not recommended that there should be any radical change away from rice production in the short or medium term, but rather that technical improvements in rice cultivation should be sought with appropriate incentives and institutional support in order that increased production may be obtained.

2.12 Other Annual Food Crops. Most farmers grow cassava and other food crops either in combination with upland rice or in succession to rice. A significant increase in cash-oriented production of cassava is reported in the south-east. In the north, groundnuts is of next importance to cassava. However, until recently, in neither case has there been serious work done on improving production of these crops. Cassava production can be easily increased by intensifying cultivation through the use of improved cultural practices and disease-resistant varieties. In spite of the increasing importance of cassava, particularly when rice is in short supply, it is unlikely to replace rice as the predominant food crop in the short and medium term, and this is not necessarily a desirable objective, given the lower nutritional value. However, in view of its yield potential (over 20 tons/ha under good growing conditions) and the fact that it is already a part of the farming system, expansion and improved techniques should be encouraged. There is a need for improved low cost village processing techniques of cassava into gari, (the major form in which it is consumed) as this could have an immediate impact on production. Processing into other forms such as chips for livestock feed and flour as partial substitute for wheat flour in baking should also be investigated.

2.13 It is well-known that while in the north a large number of farmers grow groundnuts in succession to rice, growing conditions are not suitable for commercial production. Although high levels of production are unlikely, research into hardy varieties adapted to local conditions and other factors such as planting time and the identification of suitable locations for growing the crop should be carried out in order to improve the existing production levels (the popular local variety is highly susceptible to leaf spot disease). Other food crops which farmers plant in small areas, either separately or mixed with rice, are maize, sorghum, millet, sweet potatoes, pigeon peas, sesame (benniseed), plantains, bananas and a range of fruits. These food crops are important in helping to provide variety and a better balanced diet. They are also an important feature of the cropping and farming systems, and research should be oriented towards varietal improvement, and determining their compatibility with inter-cropping, adaptability to local conditions, and their potential role in the rotational cycle of a system of permanent cropping.
2.14 Oil Palm. 1/ The oil palm occurs "semi-wild" in natural groves in the rain forest and savanna regions throughout West Africa. In Sierra Leone, the groves are fairly open and yields per unit area are low. Nevertheless, because the oil palm is so widespread in the country the natural groves are the main stay of production and will remain so for the next decade at least. The oil palm has also been planted in an organized manner on estates and associated outgrower holdings. The area of this type of planting is relatively small by comparison with the groves and would amount to about 15,000 ha, of which some 30%, the former SLPMB areas, are semi-abandoned.

2.15 The future production of the natural groves is impossible to project with any confidence as it is dependent on a wide range of variables. A major factor is the frequency of cultivation of food crops in the groves without application of nutrients and the length of time of the bush fallow period. It is likely that the progressively shorter periods now in practice will lead to a decline in yields of the natural groves, from their already low levels, following palm damage and destruction from burning.

(ii) Export Crops

2.16 Coffee and cocoa are the main tree crops in the country, with areas of about 75,000 ha and 47,000 ha respectively. Annual production levels are subject to considerable fluctuations due to price as well as climatic factors. Furthermore, exports by the SLPMB do not reflect the unofficial exports to Liberia, which can be quite high depending on local prices and foreign exchange rates. Therefore, official exports fluctuate between 5 and 13,000 tons of coffee and between 6 and 10,000 tons of cocoa, though over the past three years, the magnitude of the fluctuations has declined (see Supporting Paper 1, Annex 1, Table 11). It is estimated that the average annual exports should be about 12,000 tons of coffee and 10,500 tons of cocoa. Exports of coffee and cocoa were 10,000 and 8,700 tons respectively actual in 1982/83 and 6,300 tons of coffee and 10,000 tons of cocoa in 1982/83. The coffee and cocoa areas are almost entirely planted with low yielding planting materials and are operated on traditional lines by smallholders with upkeep limited to minimum underbrushing to provide access for harvest. Under the IAD projects, these crops have been planted in an organized manner with provision of adequate inputs over areas of 2,000 ha each of coffee and cocoa planting and some 1,000 ha each of coffee and cocoa rehabilitation. In addition, SLAPCO, a subsidiary of the SLPMB, has recently developed a coffee/cocoa estate of around 1,000 ha.

2.17 Palm Kernels. Since palm kernels are a by-product of palm oil processing, the bulk of production is presently, and will continue to be, derived from natural groves. Exports have declined from around 50,000 tons in 1975 to only 11,000 tons in 1981/82 as a result of depressed world market prices, compounded by the overvalued exchange rate and export taxes. While there has been increased local use in the production of refined palm kernel oil for the urban markets by the Palm Kernel Oil Mill, it does not fully account for the reduction in exports. There has been an overall reduction in

1/ Further details and specific developmental recommendations on tree crops are presented in Supporting Paper 6.
production and a striking feature of this decline is the almost complete disappearance of sales originating from the Northern Province, which up to 1978 accounted for about 30% of total sales to the SLPMB. This feature is attributable to both depletion of the natural groves and poor marketing arrangements.

2.18 Ginger. This crop is well-adapted to the upland soils, being suited to regions with a warm and humid climate and an annual rainfall of 1500-3,000 mm. With standard agronomic techniques, yields of 10-15 tons/ha of green ginger can be expected. Approximately 15% of this weight would be obtained in dry ginger. The quality of ginger purchased by the SLPMB is reported to be poor and emphasis should be placed on quality improvement rather than additional planting. Ginger is tolerant of light shade and is a potential intercrop for coconuts (presently of minor significance, but with potential for development. See para 2.28).

2.19 Other Crops. Other crops in which activities are underway are sugar and tobacco. With Chinese assistance a sugar factory has been established at Magbas (S.E. of Makins in the center of the country). This is an estate operation and attempt has yet been made to encourage outgrowers. Little is known of the scheme, but it is said to be producing about 7,000 tons of sugar from an area of about 2,000 ha. Scope exists for further development of this crop, and considerations might be given to use of the technology for small-scale processing plants which has been developed over the past few years. The most significant smallholder based activity is in the tobacco subsector. Where the Aurcole Tobacco Company is now expanding local production significantly. The company has its own field extension staff and in 1983 had 6,500 contract growers with a total of about 1,000 ha under tobacco. Provision of inputs and of curing are fully controlled by the company, which plans to expand its operation to cover about 2,000 ha and 13,000 growers by 1986. The company is fully satisfied with local grower performance and has started a limited export of high quality fire-cured leaf.

C. Development Potential for Major Crops

(i) Farming System Potential

2.20 The existing low input/low output and land extensive bush fallow system is considered well-adapted to the upland agro-climatic conditions if the fallow period is at least ten years between the one or two-year cropping periods, though some experts argue that 18-20 is optimal from yield and soil conservation aspects. The minimum fallow requirement implies that the 4.3 million hectares of arable upland (less the tree crop area of 0.1 million hectares), the maximum available for cultivation in any one year would be about 0.4 million hectares. Since the annual upland cultivation is about 0.33 million hectares (Annex 1, Table 1), it would appear that on a national basis the limits of the system have not yet been reached. However, this national average disguises considerable regional and local variations. The findings of the LRSP surveys are an emerging disequilibrium in the system due to a steady decrease in the length of the bush fallow period, following the increasing
pressure of a growing rural population on the land. Furthermore, average farm sizes have been falling from about 1.8 hectares in 1971 to 1.33 hectares in 1979.

2.21 The consequences are extremely serious as yields under the bush fallow system appear to be declining and permanent loss of fertility through soil degradation will become of increasing magnitude. Alternative technologies for more land-intensive rainfed food crop agriculture in the uplands, to replace the bush fallow system, have yet to be fully developed and, furthermore, their successful application would require a relatively high level of technology with efficient extension and input delivery systems.

2.22 Rice Potential. It is essential, therefore, that major emphasis be placed on intensification of swamp development where potential rice yields may be several times larger than under rain-fed upland conditions. Only 10% of the total swamplands of approximately 1.0 million ha is estimated to be cultivated annually. Of the four main types of swamp environment (para 2.06 and Annex 1, Table 2), the inland valley swamps represent more than half and vary from around 10 to 200 ha in size; fortunately, they have fewer technical problems in terms of flooding, salinity and acidity as compared to the other types. With the introduction of water control and other technological improvements, a major contribution to national food production could be derived from these areas. The recommendation presented in para 4.11 (and developed further in Supporting Paper 4) for the development of "swamp/upland complexes" seeks to provide a viable system of introducing swamp development into the farming system, while meeting the risk preferences of farmers and reducing the labor constraints. However, this potential will take time to develop. In the short run, the main potential for increasing rice output will lie in the riverain grasslands using some mechanized land preparation, and in the upland areas where improved seed in particular is an important potential source of production increase.

2.23 Tree Crop Development. The other area of emphasis, again aimed at part replacement of bush fallow and rainfed food cropping, is tree crop agriculture in the areas of agro-climatic suitability, which are predominantly in the Eastern Province. Of the main existing tree crops, the greatest potential in the humid areas of the country are for coffee for export and oil palm for domestic usage; the land area suitable for cocoa is limited. There is also potential for coconuts and rubber which are presently undeveloped, except for scattered trees and about 1,000 ha of rubber largely unexploited on government and private estates. The area of land with fair suitability for coffee, oil palm, coconuts and rubber is approximately 0.17 million ha. Given that about 40% of the 0.1 million ha already planted with tree crops is likely to be land unsuitable for tree crops, the additional land area available for tree crop planting programs would be some 0.1 million ha. Present yields of tree crops are very low, with coffee and cocoa estimated at 200-250 kg/ha. Yields of semi-wild oil palms in the natural groves are also extremely low both on a per palm and per area basis. With new or replantings of the above tree crops, potential yields would be three to five times larger than present levels. In order to achieve these yields, a Tree Crops Research Program (as outlined in Supporting Paper 6) should be implemented to adapt high-yielding varieties to local conditions and develop appropriate agronomic packages. There is also an
inadequate supply of good quality planting material. Ministry nurseries are generally run-down and require rehabilitation while the recent improvement of IADP nurseries should be maintained.

2.24 Oil Palm. The optimum environment for commercial oil palm production, such as that found in S.E. Asia, has a well distributed rainfall of 1800-2500 mm, with a mean annual water deficit of less than 100 mm. Under such conditions, yields of 25-30 tons/ha of fresh fruit bunches (ffb) can be obtained during peak production years. Unfortunately, the level of annual water deficit in Sierra Leone is such that yields of the above levels cannot be realized. Even in the most favorable parts of the country, yields are projected at less than 50% of those in S.E. Asia and there is no prospect of economic production of palm oil for export from Sierra Leone, whether from estate or smallholder production. However, there is justification for smallholder production for domestic consumption using an "improved traditional" technology with peak yields estimated at 7.5 tons/ha of fresh fruit bunches (ffb) and processing carried out using hand-presses. These yields are at least five times larger than those presently found in the densest wild groves. The area of additional 0.1 million ha of land available for tree crop planting would have to be allocated between the major tree crops with satisfactory potential, cocoa, coffee, oil palm in the short and medium term and rubber and coconuts in the longer term. In view of the restrictions on cocoa (soils and export market) and coffee (export market) which will limit the area of these crops, the area available for oil palm is adequate in relation to domestic requirements. Projections of future production and demand show a national deficit of some 10,000 tons of oils and fats (for consumption and industrial demand for margarine and soapmaking) in 1990, rising to 20,000 tons in 1995. This deficit can be narrowed through a Village Smallholder Program of 20,000 ha oil palm planting commencing in 1984 and spread over a 10-year period to meet consumption demand for crude palm oil, industrial demand could be met by the existing nucleus estate companies.

2.25 Palm Kernels. Since one of the factors explaining the decline in palm kernel production is the laborious and time-consuming task of cracking the palm nuts, it is proposed that simple nutcracking equipment should be introduced under the above Village Oil Palm Program. This should also improve quality as the period between harvesting and cracking would be reduced. These improvements, along with those planned for the oil palm companies, should result in increased availability of palm kernels for domestic processing to meet the growing demand for refined oil for consumption and use in margarine production. An expansion of the refining capacity of the Palm Kernel Oil Mill may then be warranted.

2.26 Coffee. The planting material is old and low-yielding, and the potential for increased yield through new/planting or rehabilitation is good. Either of these approaches can be used, depending on the local situation. Where existing coffee is likely to respond to rehabilitation, this approach should allow rapid returns at a relatively low investment cost. Under existing programs, annual production of coffee should increase from the present 10,000 tons to about 12,000 tons. Under the existing international quote, Sierra Leone may export 16,000 tons. A program of 5,000 ha each of rehabilitation and replanting over 3-5 years could fill the current gap of 4,000 tons, if the quota should be increased then the programs could be extended accordingly over a longer period.
2.27 Cocoa. The existing area of cocoa is planted largely with old low yielding Amelonado seedling materials. There is good potential for increased yields through new/re-planting. However, the area of gravel-free soil, where satisfactory yields can be obtained, is relatively small and estimated at around 5,000 ha (UNDP/FAO LRSP), under the Eastern IAD Project Phase III cocoa rehabilitation and planting totalling 1,800 ha is planned. This seems like an adequate program in the short term. In the longer term, measures should be taken to select and plant the areas of best agro-climatic suitability so as to maintain export production levels. Such a program would allow the release of land presently planted with cocoa but unsuitable for the crop, for planting with other tree crops.

2.28 Other Tree Crops. There does not appear to be any major pest or disease problems, which would restrict development of the other tree crops with agronomic potential. The major constraints are the unavailability of high-yielding planting materials and adaptive research. For coconuts, the priority should be the establishment of seed gardens to produce high-yielding hybrids from material from the Ivory coast. The Commonwealth Development Corporation (CDC) had identified a potential rubber project in 1980, but the terms and conditions of their involvement had been unacceptable to Government; and, therefore, rubber potential would need to be re-examined. Tree food crops, of minor significance of present but with some likely potential, include Pentadesma, breadfruit, citrus and fruit trees; they should be included in the Tree Crops Research Program (para 2.22), but with lower priority than the main tree crops.

(ii) Regional Implications of Crop Potential

2.29 The favorable agro-climatic suitability for the crops in the Eastern Region has led to the development of a cash economy, while in the North with a shorter growing period, the system of bush fallow is still predominant and production is mainly for subsistence. The establishment of agricultural development projects over most of the country (para 1.10 and Map 14746) represents a major effort to lessen regional disparities but the Eastern Province will remain a higher potential area and increasing production in this area will be important, in view of the need to increase export receipts. In the medium term there are opportunities for additional tree crop investment in Ecological sub-areas 5 and 8 in Northern and Southern Provinces, respectively (Table 1.1). Otherwise, the main thrust in improving the lower income regions should be to exploit the potential of the swamps for rice and, where feasible, other crops, e.g. tobacco or food crops, particularly in the non-rice cropping period.

D. Other Producing Subsectors

2.30 The livestock, fisheries and forestry subsectors are relatively minor subsectors; they are not expected to be major sources of growth in the near future and have therefore not been subjects of further analysis in this review. Furthermore, as indicated below, there has been a relatively recent or ongoing study in each subsector.
Livestock. The major livestock are cattle, sheep and goats with swine and poultry of minor significance. In a 1979 aerial census, estimates were: cattle 330,000 head, sheep 240,000 and goats 134,000. Practically all cattle are of the N'Dama breed which is tolerant of trypanosomiasis. Over 80% are in the Northern Province owned by members of the Fullah tribe who are traditional pastoralists. Sheep are of the Djallonke breed and unlike cattle are widespread in the country. They are tolerant of trypanosomiasis but suffer from internal parasites and foot infections. Goats are of a dwarf variety and have fewer foot problems than sheep. Like sheep, they are scavengers in villages and urban areas. Government considers that emphasis should be placed on village animals, particularly small ruminants and poultry rather than on commercial livestock, this appears to be an appropriate policy. Considerable improvements could result from provisions of basic veterinary services, mineral salt licks and establishment of supply systems. A detailed study and recommendations on the subsector are presented in the 1979 Livestock Study by Hunting Technical Services Ltd.

Fisheries are a relatively important industry, providing a livelihood for about 50,000 people, 16,000 of whom are engaged in full-time or part-time fishing and the remainder in processing and marketing. The industry may be classified into three components: freshwater inland fishery, marine based artisanal fishery and industrial fishery. Catches of these components were respectively 11,000, 45,000 and 105,000 metric tons, assessed by the Canadian International Development Association (CIDA) in 1979. There is potential for development, but further work needs to be done on the socio-economic aspects (of inter-relationships in the production chain etc.) and a number of policy issues relating to control, legislation etc., would have to be resolved. Several countries - e.g., Canada, Germany, Italy, the U.S.S.R. and Denmark - have extended assistance to or are involved in commercial activities in the sub-sector. A recent CIDA study is focussed on the marine artisanal component and proposes improvements in fishing vessels, equipment, landing facilities, processing and marketing. Given the multiplicity of external involvement (both private and governmental), and a flow of resources apparently appropriate to the absorptive capacity of the subsector, it would appear that there is no urgent need for further assistance at this point.

Forestry. Two detailed studies of the subsector have been completed - The 1978 Atlanta Industries Report on Forestry Resources and the September 1982 Forestry Development Project Preparation Report by FAO/CP. The forestry subsector is estimated to contribute about 2 to 4% of GDP, of which one-fourth is accounted for by wood processing activities; fuelwood is the major use of the national forest resources but there are no reliable estimates of annual production. Of the total estimated annual output, roundwood accounts for 2.65 million cubic meters, sawlogs for about 40,000 cubic meters (1.5%) construction and utility poles 105,600 cubic meters (4.0%) and the remaining 2.5 million cubic meters (94.5%) are attributed to fuelwood. Modest exports of logs, about 10,000 cubic meters were initiated in 1977 but were recently prohibited by Government on the grounds that it encouraged deficient forest management practices. Prospects for establishment of large-scale plantations for export of pulpwood and chips are not favorable. The FAO/CP study proposed Forestry Department plantings for fuelwood for use in the urban markets, for tobacco curing and sawlogs, and also for domestic consumption. There is a
need to strengthen research in the sector, this is currently minimal. An area for possible action is the establishment of small local nurseries to encourage dissemination and planting of quick-growing species. Forestry would not be a major center for growth but it is, nevertheless, essential that the national forest resource be conserved and administered with greater efficiency and therefore external assistance should be sought for this subsector.

E. Institutional Arrangements

(i) Primary Public Sector Services

2.34 The sector is currently being served by two Ministries - the Ministry of Agriculture and Forestry (MAF) and the Ministry of Natural Resources (MNR) responsible for Livestock and Fisheries. The major problem is inappropriate priorities in the allocation of resources. As a result, both Ministries are over-staffed, poorly organized and ill-equipped to fulfill their roles in the development of the sector. The IADPs - externally funded, semi-autonomous project management units - are the major vehicles for providing services to the sector.

2.35 Because the seven IADPs (six ongoing and one under preparation)(Map 14746R) encompass more than 80% of the country, they have effectively displaced the regular MAF at the field level. However, the IADPs were designed for specific developmental objectives within limited time-frames and their functions must eventually be incorporated within the regular MAF structure. Thus, the primary institutional issue in the agricultural sector is how to improve the capacity of an essentially inactive MAF to the point that it can efficiently and effectively assume responsibility for the programs currently being implemented by the IADPs. The associated problems and recommendations on this issue are discussed further in Chapter V.

(ii) Support Services

2.36 Research is carried out by the Rokupr Rice Research Station (RRRS) and the Njala University College (NUC). RRRS is financially supported by UNDP and the West African Rice Development Association (WARDA) and there is collaborative research with other institutions such as the International Institute of Tropical Agriculture (IITA) in Nigeria; it was originally established to investigate improved practices for mangrove swamp cultivation but its activities have been expanded to include other types of swamp lands as well as some work on upland rice. NUC embarks on various research programs from time to time, at present the two major programs are the Work Oxen Project (see para 4.14) and the Adaptive Crop Research and Extension Project. There is insufficient coordination between the two research institutions and also between them and MAF. In 1980, the USAID financed ACRE project was established at NUC with the objectives of establishing linkages between research and extension at the farm level. However, there is still the problem of coordination among these institutions, the IADPs, and MAF, since the country has no national research policy to provide guidelines for determining priorities or directing research
in the appropriate directions. Recommendations on the organization of research activities and priority research programs are discussed briefly in Chapter IV with further details in Supporting Papers 3, 4 and 6.

2.37 Rural Credit. In spite of repeated Government efforts (through IADPs, Credit Guarantee Schemes, the National Development Bank, etc.) to extend credit to the agricultural sector, the rural credit system is still dominated by the traditional relationships between the farmer and the village trader. The credit systems under the IADPs have been the major sources of institutional credit but they have proved to be expensive, and with poor recovery records their long-term viability is questionable. Several studies have been financed by IDA, the Government and other organizations; the results indicate that fundamental issues remain unresolved. These issues relate mainly to (a) the type of credit policy that is appropriate for farmers existing at the barest subsistence level; and (b) the appropriate institutional approach given the high costs, small size of individual loans, traditional perceptions, relationships, etc. Bank staff are engaged in continuous discussions on these issues with the Government and in the implementation of measures to improve the efficiency of the existing approach of credit units within or closely linked to the IADPs. It is too early to arrive at firm conclusions on the success of these measures or to recommend any radical changes in approach. The most that can be said at this point is that efforts should be concentrated on promoting the formation of farmer groups and their involvement in the credit systems along the lines recommended in Chapter V, paras 5.09-5.11. An alternative approach, which in the initial stages would be complementary to the credit systems of the IADPs but in the longer term could assume their functions, is the proposed Rural Banking Program of the Bank of Sierra Leone. The proposals are to establish a pilot Rural Bank within the Magbosi IADP area and depending on its success, the program would be expanded gradually.

2.38 Input supply is also handled mainly by the IADPs, though there was also a two-year FAO/MAF Fertilizer Marketing Project from May 1980 to 1982. It is expected that MAF (though the IADPs and their proposed successors - Regional Service Management Units - See Chapter V) will continue to be responsible for input supply for some time until this function can be taken over by the private sector/farmer organizations. There have been problems with the timeliness of delivery of inputs but with improved forward planning and better liaison among the extension, credit and marketing sections of the various regional programs the problems are being resolved.

2.39 The supply of improved seed for rice remains a thorny issue. The Seed Multiplication Project (SMP - financed under German Technical Aid) has been in operation for about four years but the synchronization of supply and demand has been elusive so far. The project is based on a system of private outgrowers. In 1982 when there was a shortage of rice and the SLPMB/NAPCO 1/ started offering Le 20 per bushel of paddy (unmilled rice), compared to the government regulated price of Le 15 per bushel paid by the SMP, most of the

1/ SLPMB - Sierra Leone Produce Marketing Board; NAPCO - National Produce Company, a subsidiary of the SLPMB.
outgrowers sold their seed paddy for consumption purposes, thereby creating a major shortage of seed paddy. In the previous year, the IADPs and the SMP had a surplus of seed paddy on their hands. It is expected that with the current efforts on closer cooperation between the SMP and the IADPs, better forward planning by the IADPs and implementation of the recommendations on pricing policies and procedures (Chapter III), these problems will be resolved. The longer term role of SMP remains to be resolved, however. The supply of groundnut seed is being carried out by the Northern IADP using an outgrower program. NAPCO had been involved at one stage and had made efforts to import improved varieties but have withdrawn from this activity and are concentrating on marketing activities. Some amount of research is being pursued under the ACRE project. Recommendations on the selection of varieties, the research priorities and the direction of extension to women (who are the main cultivators of the crop) are presented in Supporting Paper 4. Improved cassava clones are not currently available, their provision is included in the proposals for a cassava project in Supporting Paper 4. For the tree crops, the IADPs have various ongoing nursery programs. The problems have been in the selection of material for propagation and the high costs of operating the nurseries' efforts are being made to improve plant selection and to import better quality material from the Ivory Coast. In the case of oil palm, there has been importation of higher quality planting material (Dura X Piaifera) from the Ivory Coast since 1972 for the planting of a total of 7,000 hectares. Efforts are also being made to develop village nurseries under the management of farmer organizations in the Bo-Pujehun and Eastern IADPs. Recommendations on improvements and expansion of nursery and research etc. are in Supporting Paper 6. The marketing of output is discussed in Chapter III, as it is an important aspect of the incentive structure.

(iii) Land Tenure

2.40 The traditional tenure arrangements for farmland are of two types - land holding and land use. Land holding rights are vested in the lineages of the established families of the communities. Within a village, each family holds a section of the territory as a corporate group. The family elder allocates the use of that land among members subject to the approval of all household heads within the family. The elder attempts to maintain equity in the land allocation process in terms of plot size, proximity, and number of years of bush fallow. Membership in the family is the only necessary condition for obtaining a piece of land for farming. Land use rights may also be granted by the family elder to non-members. There are considerable variations in the conditions governing these arrangements. Usually a modest fee is paid and while the land user (tenant) and his heirs have rights to the benefits of fixed investment such as swamp development or tree crops, under no circumstances can they assume land holding rights or assign user rights to anyone else.

2.41 These traditional arrangements were well adapted to the bush fallow cropping patterns. The elders efficiently managed the land allocation to maintain ecological equilibrium and equity among members. Land was plentiful and it was relatively easy for landless farmers to obtain land for annual cropping. However, as population pressures reduce the availability of land to support the traditional, extensive, shifting cultivation system, and as the
rural economy evolves and most households have some interaction with the money economy, pressures are increasing for some degree of change in these traditional systems. These forces will require greater intensity of land use and crop production, which to be achieved will require that someone invest labor or capital in improvement of the land resource, e.g. by development of swamps, planting of tree crops or soil conservation works. These generally require security of occupation, some clearant and final system for resolving disputes, and some means by which the individual who has made the investment and created an asset can realize its value, either by transferring rights to use it to another, or by using it as a collateral. The removal of these difficulties caused by the traditional land tenure system and other land related matters require the resolution of a number of issues and supporting institutional policies from Government. The major issues may be summarized as: (a) legal issues - means of codifying land rights in some consistent manner; laws relating to land leasing and tenurial security for swamp and tree crop; the delineation of boundaries between villages, urban/rural etc., and the legal status of swamp areas; (b) financial/economic issues which relate to appropriate systems of land taxation and land distribution; (c) technical issues arising from the weaknesses in the land data base, mapping and surveying capabilities etc; (d) institutional issues which relate to the allocation of authority over land-related matters among the various national and local bodies concerned. A comprehensive review of these land-related issues was carried out during the course of the Sector Review; the discussions and recommendations are elaborated in Supporting Paper 2. The major recommendations that relate to organizational arrangements can be grouped in three categories: (i) improvement of the land data base; (ii) review and amendment of land laws; and (iii) improvement of the institutional framework.

2.42 The first step in improving the land data base should be the establishment of a national mapping and surveying agency with an adequate measure of autonomy in its operations. It would provide services to the other governmental agencies and to the private sector and would be the sole mapping and surveying agency as the country cannot afford to duplicate the high cost of equipment and staff required for this technology. The surveying services would include soil classification, assessment of land capability, etc. Several institutional options exist for establishment of the agency and these are presented in the Supporting Paper. These would be discussed with Government within the framework of the overall institutional reforms discussed in Chapter V.

2.43 Review and amendment of land laws are necessary, especially in relation to land leasing, the customary land judicial system, urban boundaries, and the freehold system in the provincial cities. A special task force should be established comprising representatives from the Ministry of Justice, MAF and the Ministry of Lands, Housing and Country Planning and of consultants including local lawyers and foreign experts in land law. The task force's terms of reference would include (i) extensive review of the above legal issues; (ii) preparation of legal texts for introduction of new amendments and bills; and (iii) provision of follow-up advice during parliamentary sessions.
2.44 Improvements in the Institutional Framework. The establishment of a local land authority as a means of improving the technical and legal aspects of dealing with land affairs should be examined further. A survey conducted in 1979/80 showed clear acceptance by farmers of such a local land authority which should provide a balance between the power of the chiefs and the landholding farmers.

III. THE INCENTIVE FRAMEWORK, COMPARATIVE ADVANTAGES, AND POLICY IMPLICATIONS

3.01 To provide basic foodstuff for its rapidly growing populace, relieve the import burden of rice and edible oils, and generate much-needed foreign exchange, Sierra Leone needs, with some degree of urgency, a production response in virtually all the major crop subsectors. Other parts of this review demonstrate that such a response, arising from a combination of selected area expansion, improved production packages and fundamental shifts in cropping patterns, is entirely feasible. Recent history indicates, however, that the incentives structure, in particular, and the institutional framework, in general, have a major influence on the sector's ability to reach its potential. This chapter first examines the incentive structure within which farmers are operating and then ranks the various crops by comparative advantage, production potential, and farm profitability. It concludes with some recommendations for changing the policy setting and improving the incentive structure, and thereby encouraging the technological changes discussed in the following chapter. The present low returns have contributed to the marked outflow of two crucial factors in technological change -- capital and young members of the community who are generally better educated and more willing to adopt improved methods (due to lower risk exposure, etc.) than the elders. Most of the capital outflow has gone into lower level education and has led to the present overstaffing of the Government services, discussed further in Chapter V. Higher returns would also move more farmers beyond the subsistence levels and reduce their reluctance to face the risks involved in technological change.

A. Incentives and Comparative Advantages

3.02 In the pursuit of its twin objectives of growth and equity -- growth of production, and improvement in income distribution across regions, income classes, etc. -- the Government has intervened considerably in the incentive framework through its policies on pricing, marketing, taxation of the export crops, subsidization of inputs and services. The exchange policy has been a major influential factor in these prices since for some time the leone was maintained at an overvalued exchange rate, thereby depressing producer prices of the export crops as well as rice through "cheap imports." Steps have been taken to rectify this problem. Following a period of about six months during which an official rate (Le 1.24=US$1.00) and an officially sanctioned commercial rate (Le 2.40=US$1.00) were maintained together. Government devalued the official rate to Le 2.50=US$1.00 on July 1, 1983. At the same time, official prices for the major export crops of coffee and cocoa were increased from Le 1,904 to Le 3,472 and Le 1,568 to Le 3,034 per ton respectively. There
still remains a higher unofficial exchange rate and it remains to be seen whether the new prices will significantly reduce smuggling and induce increased production. The official purchase price for paddy was also raised in February 1983 from Le 12 per bushel to Le 18, which appeared to have stimulated increased planting in 1983.

Rice and Other Food Crops

3.03 Rice is the major staple and accounts for up to 60% and 80% of expenditures of the poorer urban and rural households respectively. To the vast majority of people, a day's meal is incomplete without rice in sufficient quantities. Per capita consumption is about 121 kgs per annum and could reach 130 kgs by the year 2000 (see Supporting Paper 1). These rice-oriented consumption patterns are not likely to change much in the foreseeable future, especially in the rural areas. These factors have been recognized by Government in its long-standing support of rice development programs and its aspirations for attaining self-sufficiency in rice. Control of rice imports and procurement of domestic rice against administered prices stand out as the main policy instruments with which the Government has been engaged since the onset of its rice intervention policy. 1/

3.04 While the Government announces a farmgate price for paddy (unmilled rice), actual prices to producers are determined more by market conditions and vary considerably above and below the official prices, due to seasonal and locational factors. The official price serves mainly as a reference price in negotiations between farmers and traders, and may be viewed as the probable national average price. In 1982, the Nominal Protection Coefficient (NPC) 2/ for rice implied by the Government price of Le 12/bushel was 2.0; however, if the effects of the overvaluation (by 100%) of the exchange rate on inputs and outputs are taken into account, the resulting measure, the net EPC 3/, was about .95 for most rice technologies, implying no effective protection to domestic production. The DRC analysis, summarized in Table 3.1, shows that at the 1982 exchange rate (Le 1.24=US$1.00) and rural wage rates of Le 2.5 per day, Sierra Leone did not have a comparative advantage in rice production for the Freetown market under any of the existing technologies. At the late 1983 official exchange rate of Le 2.50=US$1.00, and at the reported 1983 rural market wage rate of Le 3.60 per day, all of the technologies (except traditional swamp) gain an economic comparative advantage. Table 3.1 shows DRC's for the different technologies for the 1983 exchange rate, assuming both wage rates of Le 2.5/day (the 1982 rate) and Le 3.60 the rate reported in late

1/ See Supporting Paper 1 for further discussion of Governmental interventions, including input subsidies.

2/ The Nominal Protection Coefficient is the ratio of the actual producer price of a commodity to the border price adjusted to farmgate.

3/ The Net EPC - The Net Effective Protection Coefficient - compares domestic value added with value added at border prices adjusted for exchange rate deviations.
1983. 1/ As would be expected the impact of the devaluation on the DRC - assuming no change in labor value - is greatest for the traditional technologies with their negligible use of purchased tradeable inputs. For the same reason, the increase in the DRC assuming higher labor costs is proportionately greater for the traditional technologies, and at labor values of much above Le 4.0 per day and an exchange rate of Le 2.50=US$1.0 these would all lose their comparative advantage. However, they will continue to be economical for on-farm subsistence consumption or supplying remote rural markets. The need to speed adoption improved technologies enabling labor saving is clear if the advantage conferred by the reduction of the overvaluation is to be maintained.

3.05 The rapid growth of employment in the public sector and the alternatives of diamond mining and petty trading have drawn labor out of agriculture and exerted upward pressure on wage rates pertaining to those remaining. At the same time, farmers' profit margins in rice production have been so low and their cash flows so constrained that they simply could not afford to hire enough non-family labor to increase production. Under the major cropping system -- upland farming -- the return to family was only Le 1.23 per manday in 1982 when the official farm price for paddy was Le 12.0 per bushel, compared to a hired labor wage of Le 2.50; and even with the increased prices in 1983 the return of Le 2.21 is still below the wage rate. Therefore, growth in rice production will depend not only in improvements in farmers' ability to compete for labor (through appropriate relative prices), but also on the adoption of techniques which raise the productivity of labor and reduce the risks associated with improved cropping systems, as discussed in Chapter IV. This is the major advantage of the improved upland packages. The DRC of this technology is slightly higher than the traditional method, but the return per manday and per hectare is sharply increased.

3.06 Next to rice, cassava and groundnuts are the most important food crops, followed by a range of others grown in negligible quantities, usually in a mixed system: maize, sorghum, millet, sweet potatoes, sesame (beniseed), plantains, bananas, and other fruits. Both cassava and groundnuts are partial substitutes for rice in consumption, and also provide important dietary complements in starch (cassava) and protein (groundnuts). Both are grown widely throughout most of the country, usually in mixed upland systems, but sometimes in pure stands following an upland rice crop. Neither are likely to be traded in the near future (see paras 2.12 and 2.13); therefore, no DRCs have been calculated, although cassava could conceivably be exported, given sufficient production and processing equipment to manufacture pellets for livestock feed. Regardless, increased production of both crops could be absorbed to a certain extent in domestic consumption, and could partially offset the rice import bill.

3.07 However, the observed methods by which these other food crops are cultivated indicate that they are viewed as marginal, subsistence-oriented activities; apart from components of mixed upland plots, they are undertaken

1/ The DRC-Domestic Resource Cost Coefficient of a given commodity is the ratio of the cost of domestic resources used in producing it to the net (of traded inputs) foreign exchange earned or saved.
Table 3.1

DOMESTIC RESOURCE COST OF THE MAIN CROPS BY PRODUCTION TECHNIQUES

<table>
<thead>
<tr>
<th>CROP</th>
<th>1982&lt;sup&gt;1/&lt;/sup&gt;</th>
<th>1983&lt;sup&gt;2/&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wage Rate (Le/day)</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional Upland M/</td>
<td>1.40</td>
<td>0.72</td>
</tr>
<tr>
<td>Improved Upland M/</td>
<td>1.50</td>
<td>0.78</td>
</tr>
<tr>
<td>Improved Upland O/</td>
<td>1.26</td>
<td>0.65</td>
</tr>
<tr>
<td>Traditional Swamp M/</td>
<td>1.76</td>
<td>0.91</td>
</tr>
<tr>
<td>Traditional Swamp O/</td>
<td>1.26</td>
<td>0.65</td>
</tr>
<tr>
<td>Improved Swamp M/</td>
<td>1.49</td>
<td>0.77</td>
</tr>
<tr>
<td>Improved Swamp O/</td>
<td>1.34</td>
<td>0.69</td>
</tr>
<tr>
<td>Improved Swamp T/</td>
<td>1.39</td>
<td>0.73</td>
</tr>
<tr>
<td>Improved Swamp P/</td>
<td>1.18</td>
<td>0.66</td>
</tr>
<tr>
<td>Riverain Grassland</td>
<td>1.35</td>
<td>0.70</td>
</tr>
<tr>
<td>Existing Improved Seed</td>
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<td>0.56</td>
</tr>
<tr>
<td>Coffee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low level Inputs</td>
<td>0.76</td>
<td>0.39</td>
</tr>
<tr>
<td>Intermediate Level Inputs</td>
<td>0.63</td>
<td>0.33</td>
</tr>
<tr>
<td>Cocoa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low level Inputs</td>
<td>1.02</td>
<td>0.53</td>
</tr>
<tr>
<td>Intermediate Level Inputs</td>
<td>0.94</td>
<td>0.49</td>
</tr>
<tr>
<td>Oil Palm (Village Processed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low level Inputs</td>
<td>1.20</td>
<td>0.62</td>
</tr>
<tr>
<td>Intermediate Level Inputs</td>
<td>1.18</td>
<td>0.61</td>
</tr>
</tbody>
</table>

M/ Manual Cultivation
O/ Oxen Cultivation
T/ Tractor Cultivation
P/ Power Tiller Cultivation

1/ Exchange Rate = Le 1.24 = US$1.00
2/ Exchange Rate = Le 2.50 = US$1.00

Source: Mission survey and various reports.
mostly by women on plots previously cleared for upland rice. It would appear that their production is also constrained by the same disincentives affecting rice: too low output/input price ratios and poor access to markets. Given Government's limited ability to influence price levels of these crops, their promotion must depend on development and dispersion of improved, disease-resistant varieties with associated yield increases sufficiently large to bring about a more formal, intense role in the cropping system.

Tree Crops

3.08 In December 1982, the Nominal Protection Coefficients (NPCs) were .66 and .82 for coffee and cocoa respectively, reflecting export taxes of 30% on both crops, partially offset by a subsidy of about 14% on cocoa financed from the Stabilization Fund. If corrections are made for a hundred percent currency overvaluation, the resulting estimated Net EPCs would be .33 and .40 for coffee and cocoa respectively. It is therefore not surprising that coffee and cocoa holdings do not receive adequate maintenance in the forms of minimal pruning, underbrushing, and spraying. Following the exchange rate adjustment, coffee prices were raised to Le 3,472 per ton and cocoa to Le 3,034 per ton (para 3.02). With these adjustments the incentive structure would be improved somewhat, but most farmers would still be receiving only about 50%-60% of the f.o.b. prices for coffee and cocoa as a result of the export taxes (30% of f.o.b. prices) and trader margins. The DRCs in Table 3.1 indicate a very strong comparative advantage in producing coffee at the 2.4 exchange rate and a lesser, though still substantial, one for cocoa. If these comparative advantages are to be exploited fully, and the present balance of payments situation demands that they should, then the incentive system would have to be at a high enough level to encourage production and discourage smuggling.

3.09 The situation for oil palm is similar. Production has been depressed by adverse pricing policies. The Government's policy of setting the prices at which the parastatal companies (see Supporting Paper 6) could purchase ffb and sell palm oil considerably below market levels, undermined the viability of the estates and their associated outgrower programs. As a result, the companies have not been able to build up sound financial bases, maintain their capital equipment and develop infrastructure (trucks and roads) to collect fruit from the outgrowers whose production is now beyond their own household and other private processing capacities, so that a considerable amount of fruit is lost every year. In the meanwhile, imports of edible oils have been growing rapidly, increasing to about 4,000 tons (Le 5.4 million) in 1982, and now rank second to rice in food imports. Palm oil (and groundnut oil) can be substituted for almost all of this, and Table 3.1 shows comparative advantage in producing for domestic consumption. With exchange rate adjustments, an incentive pricing policy and organizational restructuring, the nucleus estate programs would be able to meet the industrial demand for fats and oils and the urban demand for refined palm kernel oil which are currently being met by imports. The consumption demand for crude palm oil, especially in the rural areas, would be satisfied more efficiently by the smallholder sector with improved processing facilities (see Supporting Paper 6).
B. Elements and Potential Impact of an Incentive Pricing Strategy

3.10 The goals of pricing policy in Sierra Leone should be centered around the provision of adequate incentives to exploit the comparative advantages and thereby generate the production responses to reduce the food import burden and promote export crops. Other goals, such as the provision of cheap foodstuff (wage goods) to increase the supply of urban labor for industrial development, should be given vastly lower priority than at present, given the existing structure of the economy and the limited potential for industrial development in the near future. The past policies of low urban food prices have not contributed to any significant industrial development, but has led to a worsening of rural incomes, considerable rural out-migration and a rapid expansion of the service sector, especially government services with corresponding budgetary problems. In the meanwhile, agricultural growth has been constrained by labor shortages at peak seasons and low producer prices (para 3.04). Pricing policy objectives, as related to incentives, must include promotion of stability and confidence, in addition to an adequate level of prices received by farmers at any point in time.

(i) The Exchange Rate and Taxes

3.11 The pricing strategy should be the promotion of competitive market-determined prices. In the case of rice, there is a limited amount of free trade because most farmers have credit obligations to the traders, which are established during the "hungry season," that is, between planting and harvesting. The Government-announced paddy and rice prices serve as reference prices in the negotiations between traders and farmers, as well as the prices for NAPCO operations. In order to promote economic efficiency and the appropriate levels of imports, the announced prices should be based on import parity prices, adjusted for handling and transportation (for rice) plus processing costs, etc., for paddy. The import tax was introduced as a means of generating revenues and it can also be justified in the short term as being necessary during the adjustment process to more efficient production methods.1/ The tax should be adjusted to minimize the effects of fluctuations in international prices, but should not exceed 10% unless the leone should again become overvalued, in which case, tax increases would be necessary until the currency is realigned. For export crops, the strategy should be to pass on as much as possible of the f.o.b price to producers. While the importance of the export taxes as a source of Government revenues is recognized, the levels and tradeoffs must be considered as discussed in para 3.16 below. An incentive pricing strategy which also incorporates an element of stability (which is important for tree crops with their long gestation period and for swamp development) would be one which is based on three-year moving averages of international prices (past and projected), reinforced by SLPMB's stabilization fund resources (for export crops) and appropriate tax rates.

1/ The differences in efficiency among production methods is illustrated by the returns and DRCs in Table 3.1. Further details on these production systems are in Chapter 4 and Supporting Papers 4 and 5.
3.12 The most direct means of influencing agricultural prices in Sierra Leone is through the exchange rate, since all of the major commodities or close substitutes for them are traded (rice, coffee, cocoa, and oil palm). In turn, the preponderance of agriculture in the economy and foreign trade make these prices together a key factor in the rational determination of exchange rate policies. It is absolutely essential that the system of exchange rate adjustment should be continued and one of its major objectives should be to maintain incentive pricing levels for the production of these commodities. Higher exchange ratio will also serve most often other objectives, such as the promotion of non-agricultural exports.

3.13 Rice Pricing requires a somewhat complex analysis, but presents an urgent problem. Under assumptions of present population growth rates, limited income growth, and unchanged real prices, the demand for rice would rise from 405,000 tons (estimated) in 1982 to 520,000 in 1990, and nearly 725,000 by 2000. To meet this demand and eliminate imports (a stated goal of the Government), domestic production would have to increase at an annual average rate of 4.2% (compared to an average of 1.8% achieved over the period 1967-80). If these historical rates continue without improvement, needed imports would double by 1990 (to 162,000 tons) and nearly double again by 2000 (to 295,000 tons). It seems clear that regardless of the progress made in promoting the production of rice, demand would then have to be curtailed to a considerable extent, either through rationing or measures which increase price.

3.14 The recent increase in consumer prices, resulting from the higher exchange rate and Government's announcement of a producer price roughly equivalent to the import parity price has been a major step in the right direction. These new prices are considered adequate incentives for production at present but the real price levels should be maintained (in line with import parity price) in the future to promote production and restrict demand. Apart from the obvious benefits of directly reducing imports, such a policy would have two important spillover effects. First, other crops such as cassava, maize, sweet potatoes, and groundnuts would be more attractive in relation to rice, and some amount of substitution in consumption could be expected with possible increases in market prices and hence incentives to producers. Second, higher urban food prices will help weaken the incentives to migrate from rural areas to cities, especially if these higher prices are transmitted into higher producer prices. Current migration rates are causing alarming burdens on urban social services, while at the same time contributing to seasonal rural labor shortages.

3.15 A major weakness in the area of rice pricing has been inadequate forecasts through the growing season of production from the forthcoming harvest. This has resulted, on occasion, in late public or private purchases (perhaps at bargain rates), or requests for food aid, just before large harvests, thus having an additional depressing effect upon prices, and vice-versa. In many parts of Sierra Leone marketed surplus is small, and

1/ The demand for rice and the potential effects of alternative pricing policies are analyzed in Supporting Paper 1.
consequently marketing channels are poorly developed. As a result, local paddy and rice prices fluctuate significantly between seasons and regions. Any measures which can help reduce these fluctuations would be helpful. Such measures could include an improved crop forecasting system, which could be based on the regional M & E capability now in place over most of the country, and also a limited strategic reserve.

3.16 For the traded tree crops, higher exchange rates will have an immediate impact on farmers' incentives to increase production, if they are passed on. Ordinarily, a response would take a number of years to achieve since new plantings require a 5-7 year gestation period. However, virtually immediate (within one year) and substantial (perhaps 25%) increases in output can be achieved as farmers find it profitable to underbrush, prune, and spray their trees. And, if farmers perceive that the higher returns are permanent and that marketing channels will be maintained or improved, longer term responses in the form of new plantings will occur. For oil palm, the incentives from an exchange rate increase will be reinforced because consumers and industrial users (for soap and margarine) will find imported substitutes (other fats and edible oils) to be more expensive, and a demand shift toward palm oil will occur.

3.17 For the export crops, taxes also play an important role in the system of incentives. The present rates are 30% on the f.o.b. prices of coffee and cocoa, 10% on palm kernels, and 5% on ginger. In general, such taxes find their justification on grounds of equity, revenue generation, and stabilization of prices. In Sierra Leone, the equity argument arises because the area suitable for tree crops is limited to the Eastern and Southern provinces and on social grounds there is a case for redistributing the monopoly rents which these farmers receive to assist those in the North, where climatic conditions are less favorable. However, the discussion in para 4.16 and Chapter V on services offered by the Government raises questions on the efficiency of this approach. With respect to the revenue generation objective, the tradeoffs in terms of production foregone should be examined. The price stabilization objective is important (as discussed in para 3.11), however, the resources of the Price Stabilization Fund have often been channeled into other uses, such as the establishment of estates in the 1960s which are now abandoned. In the light of these issues, declining sales to the SLPMB and the depressed projected world prices for cocoa and, to a lesser extent, coffee, the levels of these taxes would need to be examined as part of the analysis to determine and maintain incentive prices for rehabilitation and replanting in the tree crops sector. Careful evaluation of the tradeoffs between the income redistribution and revenue generation implications of the export taxes on the one hand, and increased production, decreased smuggling and increased foreign exchange on the other hand would be necessary.

(ii) Procedures for Setting Prices

3.18 The problems of low producer prices has been compounded by the delays in price setting through Government-controlled mechanisms. As a result, signals are sent when it is too late for producer responses and often cause disruptions in the markets and lead to windfall gains to traders/money lenders. Therefore, the operations of the existing Inter-Ministerial Pricing Committee
(Finance, Trade and Industries, Agriculture, and Planning and Economic Development) need to be formalized. The current proposals on the timing of price announcements should be strictly adhered to:

(i) coffee and cocoa prices by June 30th;

(ii) producer paddy prices at the beginning of the planting season - January 31st;

(iii) palm kernels and palm oil every six months.

3.19 The translation of the broad strategy, outlined in para 3.11, into actual price levels should be carried out by the Economic and Planning Department (EPD) of the SLPMB. It would be responsible for developing alternative pricing structures, based on different assumptions on taxes and stabilization support; estimating the implications for the budget and agricultural trade account; estimating the implied net returns to different cropping systems; and comparing price levels with those in Liberia, especially for the export crops. This information should be summarized in a memorandum to the Pricing Committee who will, then, be in a better position than at present to make the final decisions in relation to the broader national objectives (regional, urban/rural equity, etc.), and the budgetary constraints.

3.20. Organizational arrangements. Through its existing network of monitoring and evaluation, data collection, extension and agricultural staff, M4AF should be able to obtain data on costs of production, efficiency in the marketing system (as reflected in variations in farmgate prices, trader margins, timely evacuation of output etc.) and regional production forecasts. However, because of its staffing constraints PEMSU is currently unable to adequately fulfill this role. It is essential that PEMSU be strengthened for this purpose. The Ministry should, preferably every six months, prepare a report for the inter-ministerial committee covering the above issues. Following preliminary consultations with SLPMB, with Ministry of Finance staff on feasible ranges of taxation rates to be included in the analysis and, if necessary, with staff from the Bank of Sierra Leone or foreign exchange implications, a memorandum to the Committee, containing price proposals should be prepared. The memorandum should be circulated at least 4 weeks before the date of announcement to the members for comments, revisions, etc. The Committee should convene at least two weeks before the date of announcement, so that conflicting issues could be resolved in time. Once prices have been agreed upon, they should be publicized widely in the gazette, newspapers, and radio. The SLPMB should also follow through on its proposals to post prices at key locations - main towns, villages and market centers.

(iii) Marketing

3.21 Pricing policy alone, if not backed up by the means to procure and distribute at reasonable margins the commodities involved, will remain ineffectual. The marketing of most agricultural products is dominated by private traders and has changed little over the past decades, while the Government has maintained its monopoly in the marketing of export crops through the SLPMB. While some cases of exorbitant profits by private traders
(and in some years, SLPMB) are on record, it must be recognized that the assembly, transportation, and storage of produce of many small farmers in distant, isolated areas is a risky and costly operation. Maintenance of the limited rural road network has been poor and transport costs for most farmers are high, a problem not helped by the lack of competition in transport services which results from the limited demand. Farmers organizations have been proposed as a possible means of improving the efficiency of marketing services (both of inputs and outputs)(Chapter V, para 5.11). These will take sometime to be developed, but will eventually be particularly effective for smallholders. Government intervention in marketing need not deter private competition, but it can serve to reduce the risk (through guaranteed prices at final market destinations) and reduce the cost (through continued development of feeder roads and tracks), while at the same time enabling farmers to obtain higher prices.

3.22 SLPMB, charged with assuming the Rice Corporation's role in rice marketing, has shown little enthusiasm for undertaking an active role in domestic procurements, partly because profits from imported rice were much higher (with the overvalued exchange rate), and it lacked the administrative and infrastructural means (trucks, storage, and distribution centers) to do so. Past experiences in Sierra Leone have clearly indicated that large-scale public sector participation in rice marketing are extremely difficult, if not impossible, to manage. Therefore, SLPMB's reluctance to become too deeply involved can be understood. However, it is expanding its storage capacity in Freetown (by 25,000 tons, equivalent to 30% of imports or 3 months of urban requirements) and building 5 small rice mills with storage capacities in the rural areas. This could usefully from the basis of a strategic reserve to help smooth out supply fluctuations. In the longer term, these facilities could be sold or leased to the private sector as a more efficient private marketing system is built up. The SLPMB can play a greater role by expanding its current program of assistance to village organizations in building their own storage centers and possibly to include milling facilities. This would complement the extensive programs of the IADPs in the construction of farm service centers, and milling facilities in the case of the Magbosi IADP. The SLPMB, through its trading arm, NAPCO, should also coordinate with the IADPs in assisting farmer groups in marketing their produces, since their combined facilities are sufficient to create an efficient marketing system.

3.23 The basic infrastructure for collecting and marketing export crops seems generally satisfactory, but efforts to monitor buying agents' operations, exercise greater control over sub-agents, and open up more buying centers in remote areas should be continued to ensure that farmers receive a fair share of the crops' value. The village storage centers program described above and combined farmer group/NAPCO/IADP program proposed above would also be used for export crops.

3.24 In summary, the recommendation on a marketing strategy is similar to that for credit (para. 2.36) -- continue with current efforts with greater emphasis on farmer organizations; evaluate the outcome at regular intervals; and base further change on the findings of these evaluations, in short, an evolutionary approach. Several studies (see Annex 2, Item I) have been carried out of the agricultural marketing systems in Sierra Leone, which
provide elaboration of the points discussed above. An evolutionary approach would require the development of local capability to continuously assess the progress and efficiency of the farmer marketing organizations; re-examine the role of SLPMB/WAPCO in the light of that progress; and make recommendations or further changes that may be necessary and additional requirements regarding infrastructure, training, and finance. An integral part of the development of farmer organizations should be training and assistance in marketing arrangements such as management, accounting, assembly and storage.

iv. Implications of the Pricing Strategy

3.25 The overall impact of these measures, taken conjunctively, will be to alter the incentive structures facing producers, consumers, and middlemen—all with positive results for the economy as a whole, but with some transitory income losses to certain groups. Higher prices to producers who are mostly smallholders, will directly contribute to the goals of greater production, assist in addressing the rural-urban income imbalance, and weaken the incentives to migrate. The resulting redistribution of income will go in the right direction, since urban income levels are currently distorted upward by the excess of public sector employment and, until recently, undervaluation of rice prices. The reduction in the disparities between the rural and urban sectors would contribute to the fostering of an atmosphere in which more balanced and sustainable growth can occur.

IV. THE TECHNOLOGICAL FRAMEWORK

A. Background

4.01 Virtually all production systems in Sierra Leone are characterized by low input technologies which have been employed with little variation for decades, if not centuries. Historically, there was very little pressure for change since land and labor were plentiful, and more recently, progress has been impeded by the incentive structure described in the previous chapter.

4.02 Although technical progress should rightly be viewed from a perspective of total factor productivity, technology in Sierra Leone largely remains a two-factor issue: arable land and labor. Evidence is mounting that both factors are becoming increasingly binding in complex and sometimes perplexing ways, e.g., fallow periods for upland rice have fallen from 14 years to less than 10 over the past (with concomitant reductions in yields), while swamps, with potentially higher rice yields are underutilized or idle. The availability of labor is definitely a constraint in peak periods ¹, and although

¹/ Experiments with a linear programming model of a typical small cash crop/food crop farmer operation in the Eastern IADP region showed that the shadow wage rate at certain months was twice the going daily rate of Le 2.5 at that time (mid-1982) if profits were to be maximized under existing technologies and incentives.
wage rates are well above subsistence levels, idle labor is observable in the
towns and cities.

4.03 Explanations behind these phenomena are complex and related to a
variety of factors beyond the economic, ecological, and physical limita-
tions. While such influences as social structure, tribal traditions and
loyalties, and subsistence-oriented, risk-averse behavior must be taken into
account in recommending any changes to the system, it is clear that changes
must come, particularly in the manner and intensity in which the two primary
factors of production are combined. This chapter focuses on usage of those
factors, land and labor, and touches on issues of water control and agro-
industrial development.

B. Land Saving Technological Progress

4.04 This form of progress aims at increasing productivity (output per
unit area) of existing cultivable land, or viewed alternatively, reducing the
cultivated area without reducing total production. A more subtle, but highly
important, variant in the Sierra Leone case involves the substitution of land
of a given type (e.g., rice swamps) for a type which is over-used to the point
of ecological degradation (i.e., uplands).

4.05 Upland rice farming under the bush fallow system is the most
prevalent and preferred mode of farming in Sierra Leone, and has been for
centuries (see Chapter II and Supporting Paper 4 for details). Until popula-
tion pressures forced the fallow below the minimum levels in certain areas
(see para 2.19) the system provided adequate food production for the country,
and the ecological system remained in equilibrium. A recent study by the LRSP
has found that the system is now in disequilibrium with an irreversible
process of soil and vegetation degradation resulting in increasing acidity,
loss of organic matter, soil structure degradation, erosion, and leaching.
Correcting this trend should be a major concern. Only two avenues appear to
be available, and have been pursued, albeit with mixed results: intensifica-
tion of existing uplands through improved seeds, techniques and the applica-
tion of fertilizer; and the expansion of rice in swamp areas to substitute for
uplands.

4.06 Moderate yield improvements have been recorded using LAC 23 improved
seed and modest amounts of fertilizer in most of the IADP areas. Farmers have
been quick to adopt the improved seeds when available, but have yet to be
totally convinced of the need for fertilizer. Efforts to improve upland
yields thus hinge on the performance of seed multiplication schemes, more
convincing fertilizer demonstrations, and the development of a more reliable
input distribution system.

4.07 There is also demonstrated room for improvement in existing cultiva-
tion techniques. Under current practices, rice and a mixture of other seeds
are broadcasted and earth scraped over the seed using a hoe. The seeds are
placed at varying depths and birds eat those remaining on the surface and
consequently plant density is very low. With this system of intercropping,
weeding is very difficult and therefore very little is carried out. It has been shown in various experiments that increases from 30 to as much as 90% can be obtained by using the dibbling method. However, this method is very laborious and time consuming because of the hardness of the soil. As a result, little interest has been displayed by farmers, despite the yield benefits. But in the existing system of mixed broadcasting, with little or no weeding, fertilization often expands the weed population faster than that of the crops. Use of mechanical or animal traction to provide power for land preparation makes row planting, and therefore weeding, much easier. With improved cultivation methods, however, fertilizer can be applied directly to the plants and increases from 30 to as much as 130% have been recorded. There is thus scope for increasing rice yields in the upland area. Though these are primarily land saving methods, there would also be scope for labor saving at harvesting, since with planting in rows and in pure stands harvesting using a sickle would be a much faster method than the present panicle harvesting with a knife. The latter, however, is better adapted to harvesting stands which ripen unevenly.

4.08 For the longer term, self-sustaining, environmentally sound systems must be found for the uplands. A readily available option is new plantings of coffee, cocoa, and oil palm on uplands having the appropriate soil and climate characteristics. Reforestation for fuelwood, if carefully planned and organized, could halt erosion while helping to offset the depletion of natural forests (one important, but often overlooked, attraction of upland farming is the by-product of fuelwood from the falling and clearing operations). Another option is the development of sustainable rotations of rice/cassava/legumes. Pilot studies by LRSP and ACRE indicate that such rotations, if properly maintained and fertilized, are potentially feasible.

4.09 Apart from poor incentives and traditional biases against laboring in them, the development of swamps has been hampered by technological constraints. In most of the IADPs, inland valley swamp development was the focal point of technological innovation objectives. However, despite their considerable efforts in this area, the development of swamps has not become a widespread activity throughout Sierra Leone. Only 10% of the total inland valley swamp area of 630,000 hectares, (Annex I, Table 2) are cultivated, of which less than 15% under improved methods. The major problems have been in both design and implementation. The water control systems were designed to be built in one year for the individual swamps. However, experience has shown that the introduction of drainage causes shrinkage of the soils which can change the water course and distort the alignment of the canals and bunds, which would then have to be rebuilt. In some of the virgin swamps, the drainage process may take 3-5 years, in the previously cultivated swamps the problem has not been as serious and the systems have worked more efficiently. In the Northern Province, where rainfall is concentrated in a shorter period, there have been cases where the designs have proved inadequate to deal with the flood waters

1/ The dibbling method is essentially planting the seed in holes and covering it with soil, this could be done with a stick, hoe or a seed planter. For further details on these recommendations see Supporting Paper 5.
and the works have been destroyed. Farmer groups also often find it difficult to make available enough labor to develop a swamp in one year. As a result, partially completed works may be overwhelmed by flood. Such damage could be minimized if the work could be planned from the beginning to be spread over more than one year.

4.10 The design and construction of water control systems require expertise and experience beyond that of most small farmers. While, as noted, a number of efforts have been made to promote and assist with swamp development, results have been mixed. In addition, there has been little institutional build-up of expertise or development of a consensus on the appropriate approach to swamp development. This results partly from the sporadic and fragmented nature of many development efforts; the lack of any central unit in MAF to support and advise these efforts, and the fact that in some multi-sectoral projects, engineering staff, with a range of activities to oversee, had insufficient time or experience to adequately supervise swamp development efforts. There is a need to develop a central capability in the Ministry. A pilot program of an investigative/demonstration nature, designed to develop general guidelines and approaches to swamp development should be undertaken.

4.11 The improved water control management that would be possible with this infrastructure would enhance the promotion of better agronomic practices, since the weed population would be more easily controlled (through the water level) and farmers would be more willing to adopt fertilizers. With the improved water control, line sowing instead of transplanting may be feasible in certain cases where labor is a major constraint and/or expansion in area is possible. This approach to swamp development would have a balanced effect on distribution of labor within the household, since maintenance labor (male) is reduced as well as weeding labor (female) and in some cases transplanting labor (predominantly female). The reduction in labor requirements will in turn enhance the possibilities for developing the upland/swamp complexes 1/ This "complex" approach essentially seeks to develop ecologically balanced systems of continuous cultivation of the upland surrounding a swamp to meet the preferences of farmers for diversified production systems and reduce labor requirements for annual bush clearing. The system will also eliminate another conflict between swamp and upland cultivation, which is the travelling time between the two when the fallow cycle takes the upland plot some distance away, which has often led to abandonment or neglect of the swamp.

4.12 For the extensive riverain grasslands and possibly for the Bolilands (if economic cropping systems can be developed for this area), capital intensive water control and irrigation works may be necessary. It is recommended that a detailed hydrological survey should be carried out in the riverain grasslands as soon as possible to determine the technical potential and land development requirements for extensive rice cultivation.

1/ Possibilities for developing swamps and adjacent areas as a basis for sustained agricultural production are elaborated in Supporting Paper 4.
C. Labor Saving Technologies

4.13 Labor constraints - whether physical or economic - are observable in most regions of the country, particularly during land clearing and preparation periods, and in harvesting and processing periods. Without labor-saving technological progress, these can only intensify over time: the growth rate of rural population and hence labor force is already substantially below that of the total population, and is declining relative to the total. Any growth in incomes which generates increased demand for domestic agricultural products will increase the need to increase output per manday of labor applied. In this section, the alternatives of using animal traction, power tillers, and tractors in land preparation are described, and directions for using them and other mechanical means to make harvesting and processing operations more efficient are indicated.

4.14 Due to the prevalence of tsetse, experience with animal traction in Sierra Leone has been limited. However, the Work Oxen Project, carried out at Njala University College (NUC) with assistance from MAF and British Overseas Development Assistance (ODA) offers a promising program for relaxing the labor constraints on expansion of area and also for increasing yields through better tillage, weeding etc. The project has succeeded in demonstrating the feasibility of the local breed of N'dama cattle for cultivation and transportation operations.\footnote{1}Keen interest in work oxen and implements has been observed during village demonstrations and meetings among farmers and young people. Widespread adoption of work-oxen in performing farming operations and relieving the arduous nature of the work, could prove to be an incentive to keep young people in agriculture, instead of migrating to the towns or diamond mining areas, as so many are presently doing. However, it does require stump and large root-free areas and therefore implies continuous (or near continuous) cultivation systems.

4.15 The current work oxen program appears appropriate, well organized and executed, and farmer usage is financially and economically profitable (Table 3.1). The emphasis is on upland and swamp rice cultivation with secondary emphasis on groundnuts, maize, etc. Under ODA, workshop has been rehabilitated; funding at Rolako in the Northern Province, with an initial 70 Pecotool ploughs, will be assembled. Every effort should be made to sell these units on a cash basis to the farmers who already have oxen, since the demonstration effect is likely to be greatest from this group. If this initial program and the demonstrations of the project are successful, then the program should be expanded as rapidly as feasible with full training, extension credit, animal health program support from MAF and MNR in the northern province of Sierra Leone. Later, as and when ox-cultivation proves successful in the Northern regions, the practice should be extended southward as far as the N'dama cattle could survive under working conditions given the greater prevalence of the tsetse fly in the Southern and Eastern Regions. The project should also pursue its plans to work with village blacksmiths to develop the manufacture of simple harrows and similar equipment.

\footnote{1}{Details of the program are summarized in Supporting Paper 5.}
4.16 The use of power tillers is limited and confined mostly to the mangrove swamps around Rokupr Rice Research Station (RRRS) and a few inland valley swamps in the Eastern and Southern provinces. The RRRS has been carrying out trials with the machines in the mangrove swamps for some time and has been operating a small contracting service for farmers in the area. Farmers' reactions have been enthusiastic and there is evidence that land preparation with the power tillers, in addition to speeding up and reducing the work burden of the process considerably, also increases yields slightly due to better weed suppression and improved timeliness of planting. The DRC for power tiller cultivation indicates economic feasibility and is comparable to those using oxen techniques (Table 3.1).

4.17 Since the analysis indicates that the minimum annual area cultivated (over two cropping seasons) should be of the order of about 50 ha, the most appropriate arrangement would be either joint ownership by a group of farmers or private rental schemes. It is too early to be able to estimate the potential size of the market, therefore a cautious program of importing between 100 to 200 power tillers would be appropriate. It is strongly recommended that importation, distribution and maintenance should be left to the private sector, independently or under contract with MAF if necessary. The distribution and maintenance of power tillers in the Eastern and Southern provinces at present are handled solely by the private sector - essentially one dealer at Bo in the Southern Province. These facilities and services are satisfactory, though an expansion of field service arrangements would be necessary, which does not appear to be a problem. It would also be more appropriate if the dealer(s) could provide training for farmers in the use of the tillers, preferably through farmers who are already successfully operating these machines.

4.18 There are two programs of tractor cultivation operating in Sierra Leone at present - MAF's Mechanical Cultivation Scheme and the Torma Bum Rice Development Project. The Mechanical Cultivation Scheme was set up to offer tractor services to farmers for ploughing and harrowing in the Bolilands and Riverain Grasslands. The program has practically come to a halt due to lack of spare parts and other inputs. Even at best, when the tractors and implements were new, overall performance, in terms of area tilled and total costs per acre, was unsatisfactory. In 1981, the average annual cost of the service was Le 702/ha (including depreciation) but the official fee was only Le 37/ha (Le 15/acre). Public sector organization of tractor service schemes has not yet proved successful anywhere in the developing world. The Sierra Leone Program was handicapped by the organizational structure that divided responsibility with the separate Mechanical Workshops staff responsible for tractor and implement repairs and maintenance; the MAF agricultural officers for scheduling, managing and collecting for field work and the MAF headquarters staff for the procurement of spares, fuel and other inputs.

4.19 In view of the of the problems of the program to date, and experiences elsewhere in the world, the mission is strongly against purchase of another new fleet of tractors. However, since many farmers have become dependent upon the mechanical cultivation scheme for their tillage operations and, considering the urgent need to increase rice production, it appears
prudent to utilize the existing workshop personnel and facilities to rehabilitate about 85% of the existing wheel tractors to keep them operating for another several years during which the program should be gradually phased out or turned over to the private sector, preferably through small group or even individual ownership of equipment.

4.20 The Torma Bum Rice Development Authority was established with external assistance from the African Development Bank and the Dutch Government to provide tractor rental services (on credit) and milling facilities to farmers in the Riverain Grasslands. The overall performance of the tractor rental program has been much better than MAF's Mechanical Cultivation Schemes. The fees of Le 45/acre (Le 111/ha) in 1981 reflected the estimated annual operating costs of the service, though in 1982 costs were higher (Le 60/acre including depreciation), due to a fall in efficiency as a result of management and operational problems in getting spare parts on time.

4.21 The relative efficiency of this program is due partly to the eminent suitability of the area to mechanical cultivation (with the large level contiguous tracts of land, average area tilled per tractor was 720 acres (292 ha) in 1981/82 and can be even higher). To maximize the benefits from this scheme, the mission recommends that:

(a) Organized mechanical cultivation rental services be concentrated on the Riverain Grasslands under the Torma Bum Project.

(b) The management of the Torma Bum Project be reorganized to improve its efficiency as recommended by the recent joint GOSL/ADB review.

(c) Given the potential of the area, the feasibility of private large-scale operations be explored further, beginning with a hydrological survey of the area.

4.22 Under the present system of bush fallow with the tree stumps left in the ground, there are few opportunities for mechanization of upland cultivation, though it appears worthwhile for trials to be carried out on the feasibility of using chain saws for bush clearing. For tree crops, the only operation appropriate for mechanization at present is weeding. Trials should be made with power tillers having mower attachments for weed control in comparison with ox-drawn "Kedah-type" rollers. Ox carts and sleds may also be tried for transporting tree crop harvests in the larger plantings in areas where animal traction is being promoted.

4.23 With the higher yields resulting from the improved agronomic practices, water control etc. and the higher production from the increased areas in the riverain grasslands following mechanical cultivation, the labor bottlenecks in harvesting operations will become more pronounced. Sickle harvesting of rice offers proven labor-savings when crops mature evenly, and should be introduced as quickly as possible. In the Riverain Grasslands, floating rice could be sickle harvested or mowed. At some later stage, the feasibility of tractor-drawn harvesters or self-propelled harvesters should be examined further, since trials with self-propelled harvesters seem to indicate that they can harvest semi-floating rice successfully, though the economics
have yet to be examined. Threshing methods would also need to be modified with sickle harvesting, given the greater amount of straw harvested with the rice. The most efficient low technology methods are small foot-pedal powered threshers, or portable manual units.

4.24 There is not much potential for labor-saving in harvesting of the other crops, except for groundnuts where oxen can be used for lifting the crops, and for oil palm where improved harvesting knives may be useful.

4.25 **Crop Processing** is mostly done manually either on-farm or by small traders. Rice is usually par-boiled before milling, most of which is done by rudimentary hand-pounding techniques. While hand-pounding (a mainly female activity) is a fairly labor-intensive method, it is spread more or less evenly over the year and does not appear to be a major constraint in the farming systems. Existing rice milling capacity in the country is currently under-utilised and no recommendations are made at this stage on further expansion of these facilities (see para 4.29).

4.26 The present manual method of **processing oil palm fresh-fruit bunches** (ffb) is difficult and time consuming; resulting in a considerable amount of loss since household labor cannot cope with the output of their holdings and a ready market is not always available for ffb which must be processed within a number of days after being harvested. Unharvested ffb may also cause disease problems. It is recommended that the use of a small handpress, being manufactured by the National Workshop (para 4.32), should be promoted with some minor modifications 1/ for smallholders outside the trading radius of the oil palm processing companies.

4.27 **Cassava processing** is a predominantly female activity, carried out by laborious and time-consuming methods. If cassava production is to expand, improved low-cost processing techniques would have to be promoted. The Tikonko Agricultural Extension Centre (TAES) at Bo currently manufactures an improved rotary hand-grater and a powered one, both of which appear to be successful and should be more widely distributed through the marketing sections of the IADPs.

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**D. Agro-industrial Linkages**

4.28 Existing agro-industrial linkages in Sierra Leone are concentrated in the processing of rice, oil palm, sugarcane, citrus and fruits and manufacture of equipment. In the case of rice and oil palm, there are a range of techniques of varying labor and capital intensities. As is usually the case in agricultural processing, technical efficiency tends to increase with improved technology, and hence higher capital-intensive operations as compared with more labor-intensive methods; however, at the same time assembly and distribution costs are higher. In Sierra Leone the problem has been compounded by management and technical problems in the larger and more capital intensive parastatal operations.

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4.29 Rice Milling is performed at approximately 300 rice mills/hullers of varying types and capacity, with the largest being the Government-owned rice mill at Kissy with the capacity of 3 tons per hour. Most of the rice mills are the steel-roller type, though there are also some of the rubber-roller type. An earlier study had demonstrated that if capital is costed at its social opportunity cost then only the small rubber roller types would be appropriate for Sierra Leone, and only on a limited scale. The rice milling industry suffers from low capacity utilization, though there might be certain location-specific shortages. Therefore, at this time there does not seem to be much potential for expansion in this area. The major emphasis should be on ensuring the provision of spare parts and encouraging higher capacity utilization through improved transportation services etc.

4.30 Existing industrial palm oil processing facilities are the Gambia-Mattru oil mill with a capacity of 8 tons per hour, the Daru Oil Palm Company with a capacity of 5 tons per hour and the Doctor Kobba's Eastern Area clinic - a privately-owned operation with a small press, and a capacity for 1 ton per hour. The current proposals for expansion of the Gambia-Mattru and the Daru Oil Palm Companies (under funding from the African Development Bank and IDA) are considered to be adequate at this point in time, though there is a need for organizational and technical improvements, as discussed in Supporting Paper 6. The current proposals on private sector participation in equity and management should be pursued further. One possibility is the establishment of forward linkages with soap and margarine manufacturing to benefit from the economies of integration - lower overheads, assured markets etc. There is likely to be a need to expand the palm oil refining capacity of the SLPMB kernel mill to meet the urban demand for refined oil which should be investigated further.

4.31 Very little is known about the operations of the sugar growing and processing project at Magbas, financed and operated by Chinese (People's Republic) Technical Assistance. It is reported that the operations are financially profitable but it is difficult to assess the full economic and financial implications without further information. A citrus and fruit processing plant was established at Mabole in the Northern Province with assistance from the Dutch Government. The project was poorly designed and executed - the problems were technical, financial and managerial, and the plant has been closed for over a year. However, citrus and fruit-growing are important components of the Northern and Koinadugu IADPs with the objective of correcting the regional imbalances created by the current concentration of tree crops in the Eastern and Southern Provinces. It is important that the feasibility of rehabilitating the factory should be assessed as early as possible. In the meanwhile, the concerned IADPs should begin compiling data on the potential supply from within their respective areas, logistics etc.

4.32 There are at least three operations in Sierra Leone with the capacity or planned capacity to produce agricultural equipment. The National Workshop in Freetown with an excellent group of skilled craftsmen is scheduled to be rehabilitated and expanded starting in 1983 under UNIDO/UNDP assistance. The Workshop is presently producing a number of agricultural equipment and plans to extend its line considerably (it is recommended that sickles with serrated edges should be added to the line). A problem in the past has been marketing,
until such time that the Workshop (or its parent Ministry - Trade and Industry) can organize its own sales, the IADPs could be a useful vehicle for promoting usage and distribution of the equipment. The Workshop should also explore the feasibility of manufacturing the small 5-8 h.p. IRRI power tillers and power threshers (the engines would have to be imported). Prototypes could be tested and appropriately modified while the market for these machines is being developed over the next 2-5 years. The Tikonko Agricultural Extension Center is operated by the Methodist Church with workshops at Bo where several useful items of agricultural equipment are manufactured; some of these have been discontinued because of inadequate demand. The problems have been marketing and extension to teach the farmers the proper use of the equipment. The Rolako Ox Equipment Workshop was formerly operated under Chinese Technical Aid and is being rehabilitated under the current Work Oxen Project to assemble and later fabricate draught animal equipment.

4.33 The further development of all of these operations depends not only on the effective demand for labor-saving devices, but on the development of communications and distribution networks. A large gap exists between the producers and users, which could be met through the channels of MAF and MNR. Bulletins should be prepared describing the equipment available (drawings or pictures would also be useful), methods of usage etc. These should be circulated among the extension services with price lists, for discussion with the farmers. The preferred pieces of equipment should then be obtained for demonstration by the extension services, and the commercial services of the IADPs could assist in distribution and sales until these functions could be taken over by the private sector.

4.34 There is potential for expansion of the types of agricultural processing activities. The manufacturing of cassava flour as a partial substitute for wheat flour 1/ is possible as a cottage industry or larger-scale operation. Depending on demand and technical factors, there may be potential for the substitution of cassava pellets and rice by-products for imported inputs in the manufacturing of livestock feeds.

E. Institutional Aspects

4.35 In addition to the problems of coordination among the producers and users of technological improvements discussed above, there is also little coordination among the various bodies involved in the development and testing of technological improvements. These problems of coordination are a reflection of organizational and technical weaknesses in the institutional structures involved. The proposals in Supporting Paper 3 have been developed in consultation with the officials concerned and seek to address the organizational problems by establishing a National Agricultural Research Coordinating Council (NARCC) in which the various institutions would be represented. The NARCC would be closely linked to Provincial Agricultural Research Coordinating Committees (PARCCs), whose functions would include dissemination of research

1/ See Supporting Paper 4.
results, monitoring of research programs as well as linkages with extension down to the District level. Details on specific priority research programs, including swamp development complexes, a cassava project, major tree crops and seed gardens, are discussed in Working Papers 4 and 6.

4.36 The non-availability of technically trained and skilled personnel is another constraint on the development and dissemination of technological improvements. Improvements in the approach to and methods of training are discussed in general in Supporting Paper 3, in relation to extension for food crops and women farmers in Supporting Paper 4, and for tree crops in Supporting Paper 6. There is no appropriate local program for training in agricultural engineering. The agriculture program at Njala University College (NUC) includes little engineering, and the engineering program at Fourah Bay College (FBC) has no agricultural orientation. A program to blend these skills should be formed, the orientation and curricula should be developed in consultation with the technical staff of MAF to ensure that the program is relevant to the evolving requirements. A program to train village blacksmiths and artisans in tool production, machinery maintenance and repair should be introduced at the National Workshop.

V. ORGANIZATIONAL PROBLEMS AND IMPROVEMENTS 1/

A. The Problems

(i) The General Problem

5.01 The organizational problems of the two Ministries - Ministry of Agriculture and Forestry (MAF) and Ministry of Natural Resources (MNR) constitute some of the most pressing issues in the agricultural sector at present. The specific organizational problems identified by GOSL officials and foreign donor agencies include the following: absence of clear/comprehensive objectives; adherence to narrow sectoral interests; fragmentation of sectoral organization; inadequate extension services; inappropriate priorities and allocation of funds; insufficient capital; and inadequate research and training. As a result of these problems, the operational costs of government services to the sector present a major drain on the budget, while agricultural performance and contribution to tax revenues have been declining. The implementing ability of the Ministries is also constrained by aspects of the rural-social organization and the personal priorities and incentives of farmers. All of these organizational problems are related in a reciprocal and mutually reinforcing manner. If the amelioration of only one or two problems is addressed by a specific strategy without a clear understanding of their relationship to other problems, the strategy is unlikely to be successful. Further, solutions to most aspects of these problems are not primarily

1/ A summary of the discussion is presented in this Chapter; further details are in Supporting Paper 3.
structural. Rearranging the organizational structure can contribute towards the satisfaction of personal priorities and the establishment of appropriate operational short-term objectives. However, although inappropriate structures can stifle efficient and effective performance, appropriate structures cannot - by themselves - assure the performance of appropriate tasks. Behavior will be what counts.

(ii) The Management and "Priorities" Problem

5.02 The problems of management and the constraints on efficiency within the Ministries are directly linked to the priorities in the allocation of the scarce resources under their control. MAF distributes its own total recurrent and development budget resources as if its priorities were as follows: (a) provision of temporary employment within its own organization, (b) provision of career employment within its own organization, (c) development projects (primarily as counterpart funds for foreign donor financing) and, finally (d) recurrent operation and maintenance (O & M) services. MNR's pattern is essentially the same, although on a much smaller scale. In 1981, it was estimated that there were about 8,800 clerks and unskilled laborers on a daily-wage basis in MAF and another 1,100 in MNR. The majority of this workforce contributed nothing to the effective operations of their respective divisions, and in fact were often a hindrance to operations and could not be disciplined because of trade union and political interference. Yet in spite of these management problems, the number and costs of these staff have been increasing. In the 1980/81 estimates, daily wages accounted for 39% (Le 4.5 million) of the total recurrent costs of MAF; by 1982/83 the corresponding figures were 51% (Le 7.1 million), an increase in costs of 58% in just three years. That increase has not been matched by an increase in the total recurrent budget of MAF, which increased over that same three-year period by only 20%. The increase has been at the expense of the O & M for support services. The share of O & M in the recurrent budget has been decreasing in both relative and absolute terms from 44% (Le 5.1 m in 1980/81) to 27% (Le 3.6 m) in 1982/83. It is clear that the organizational structure of MAF is deteriorating rapidly, the administrative system is overburdened by the large numbers of unnecessary staff, and the competent staff that are there cannot maintain services to the farmer due to a lack of operational funds. Another factor straining the management and efficiency of MAF is its involvement in direct production activities and services such as Mechanical Cultivation Hire Schemes, for which few examples of successful public sector management can be found anywhere in the world. The problems of this scheme and recommendations on handing it over to the private sector are discussed in para 4.19. Two parastatal companies -- The Gambia Mattru Oil Palm Company (GMOPC) and the Daru Oil Palm Company (DOPC) -- have been established for the cultivation and processing of oil palm. Their profitability has been adversely affected by management problems as well as government's pricing policies. The current proposals for involvement of the private sector in equity and management should be actively pursued (para 4.30).

(iii) The IADP Problem

5.03 The problems of the Ministries and their limited implementing capabilities have been apparent for some time. Therefore, to promote development
while circumventing these problems, the proliferation of IADPs has been supported by foreign donor agencies. The advantage of the IADP approach was predicated on the need for: (i) integration of functions normally carried out by a variety of Ministries and agencies; (ii) close coordination of activities within each project area; and (iii) achievement of higher production targets within a limited time-frame. In practice, IADP management units exercised more autonomy and flexibility than normal within the GOSL because: (a) they were not subject to the normally restrictive GOSL regulations regarding expenditures and disbursements; (b) had tight financial controls; and (c) they were permitted to reallocate resources from one task to another as the situation required. In addition, a single management unit located at the project level provided direction and targets for staff, and project staff received higher compensation, were provided better facilities, and were subject to more effective disciplinary measures than non-project staff within MAF.

5.04 Although the performance of IADPs has not been completely satisfactory in terms of the targets originally established for them, they have been much more successful than MAF; even when the more limited objectives of MAF are taken into account. From a management point of view, the comparative success of the IADPs is due to the ability to more completely satisfy the personal priorities of their staff and the flexibility to adapt their programs more closely to the priorities of farmers. To a significant extent, that enhanced capability is due to the availability of resources, flexible procedures for their use, and the ability to recruit staff with better qualifications. However, the reasons for the comparative success of the IADPs also account for the primary organizational problem now facing the GOSL: i.e., how to integrate their activities into the normal government structure in order to continue increasing agricultural production on a viable self-sustaining basis once foreign donor assistance comes to an end.

B. A Reorganization Strategy

5.05 The proposals presented here and on the structure in section C are meant to be broad guidelines on approach, principles, objectives etc., the details would have to be worked out later as part of the actual reorganization exercise. Within the context of the problems defined above and the wider context of national constraints and objectives, a reorganization strategy of MAF and MNR should aim to:

(a) improve the efficiency of the services in terms of both use of resources and impact on production; and

(b) develop an organizational structure that is manageable but at the same time flexible and decentralized enough to implement programs.

The specific elements of the strategy are summarized in para 5.30 in relation to each phase of the recommended approach to reorganization.
(i) The Approach to Reorganization

5.06 An essential element of the reorganization strategy is the identification of the approach to be employed, that is, the process by which change will be introduced, identification of the main actors in the exercise, the means of eliciting their support and compensating the losers. The particular approach recommended for introducing change in the organizational structures of MAF and MNR is by a process of increased decentralization and participation. Decentralization would provide a manageable span of control, appropriate adaptation to local conditions, and facilitate two-way communication flows between decision-makers and other appropriate participants in the planning and implementation process. Increased participation would permit better adaptation to local conditions and commitment to the organization and its objectives. Decentralization is a necessary -- although not sufficient -- condition for effective participation. It will be important to specify the type of decentralization and participation desired and by whom. Effective implementation must be a gradual, evolutionary process involving policymakers, ministry staff and potential beneficiaries. Further, this process requires negotiation between the various parties at all levels about the best way to improve operations within the current system initially, determine what the system ought to eventually be, and design a strategy for moving from "what is" to "what ought." However, even in the context of an evolutionary process, clear specifications of structures and the timetable for decision-making will be necessary in order to ensure efficient information use and management.

5.07 The process will also need to be supported by changes in the incentive structure which is discussed in Supporting Paper 3. The conclusion is that the current system is not conducive to improvements in efficiency, and significant changes will be required to induce the necessary behavior. The system needs to be adjusted to provide better incentives for good performance and stronger disciplinary measures for poor performance.

5.08 An efficient and effective decentralized management structure for agricultural services in Sierra Leone requires, at a minimum, the following:

(a) Strong horizontal coordination at each administrative level (i.e., national, provincial, district).

(b) Individual personnel serving within specific administrative units responsible to only one supervisor who controls the satisfaction of that person's work-related priorities.

(c) Simplification, i.e., management units should be small, their recurrent costs should be low, and their functions should be specialized, clearly understood, and related to those of other management units -- both vertically and horizontally -- in a mutually supportive manner.

(d) Effective two-way communication must be maintained in order to facilitate initiative among subordinates in the context of broad policy objectives established by superiors, effective technical and administrative response by superiors, and commitment by subordinates.
(e) Distribution of responsibilities and tasks at appropriate levels of aggregation. This means that some specific tasks are performed best at national level rather than at regional level, while other tasks are performed best at village level rather than at national level.

(f) Sufficient control over the allocation of resources within each management unit to enable it to fulfill its responsibilities and carry out its tasks.

In view of the complexity of the issues and the learning processes involved, it is recommended that the reorganization program should be implemented over three phases.

(ii) Farmer participation

5.09 The final test of efficiency of the agricultural services is the impact on production and this can only be improved if there is greater interaction than at present between the agents of the services, and the farmers, herders, fishermen, etc. Farmer groups have the potential for improving the efficiency of extension, marketing and credit services to the smallholder farmers (including women farmers), and have been included as crucial elements in the proposed organizational structure presented in Chart 1. However, if positive interaction is to be achieved, farmers should organize themselves in an appropriate manner. Further, substantial changes in the attitude and behavior of extension agents and their superiors will be required. Farmers' associations should be viewed as autonomous decision-making organizations with their own internal leadership and decision-making procedures. Extension agents should be responsible for bringing farmers together in order for them to have an opportunity to organize themselves. However, they should not direct the process of organization, assume a leadership position within it nor direct the procedures according to which the organization functions. In the past, extension agents have not made concerted efforts to assist farmers in their organization, it is only in the Bo-Pujehan IRDP (financed under German Technical Aid) that a considerable effort has been made on working closely with farmers in forming their own organizations. The results so far appear quite promising, as demonstrated by their activities in tree crop nursery programs, road maintenance and other community projects.

5.10 Farmers' groups can be successfully organized if:

(a) Farmers participate in the identification of problems and potential solutions;

(b) The technical capacity of the GOSL to appropriately respond to such problems is improved; and

(c) Applied location-specific research, training, and an administrative system which can respond with technical assistance and/or material inputs in a timely manner to farmers' initiatives is improved or established. Farmers will organize when such organizations serve as a mechanism for the satisfaction of their own objectives.
Farmers' groups in one form or another already exist in many places in Sierra Leone. The problem is to discover them. Different structural forms should be allowed to emerge which are compatible with conditions in specific localities. The linkages with the institutional services will vary according to the type of activity. For marketing purposes, the IADPs could provide initial assistance to farmer organization in the transportation of produce to the farmer service centers and then from that point private traders or NAPCO/SLPMB can take over marketing responsibilities. The IADPs will have to play a key role in the initial stages in the external arrangements for the farmer organizations but as the latter develop, the role of the IADPs will diminish. For credit purposes the extension agents could also play an important role in developing linkages with the FFC, the Commercial Services Sections (of MAF and the IADPs) and the proposed rural banks. The internal and external arrangements governing the various operations of the farmer organizations will need to be developed gradually, as they evolve, in response to the requirements of farmers and legal needs (e.g., where the organization acts as agent in handling materials and funds on behalf of participants).

C. A Proposed Organizational Structure

The organizational structure presented in Chart 1 is based on the discussion above on the problems (5.01 - 5.04), the elements of a reorganization strategy, the two key principles - decentralization and participation, and the requirements for their effective achievement (paras. 5.06-5.08).

(i) Core Organizational Structure

In the context of current conditions in Sierra Leone, a distinction should be made between the Core Organization and Supporting Service Organizations. The Core Organization should be composed of Service Management Units (SMUs), responsible for providing the services which are currently the responsibility of the four current principal sub-divisions of MAF and MNR (i.e., Agriculture, Forestry, Veterinary Services and Fisheries). The Administration SMUs of the Core Organization (Chart 1) include supporting services such as financial management, planning, monitoring and evaluation of projects and programs. Other supporting Service Organizations -- both public and private sector -- are those which perform research, training, credit, provision of input, and marketing functions.

The overall administration of the ministerial structure would be handled by the National Administration SMU, headed by the Director of Agriculture and Natural Research. The Core Organizational Structure is divided into three management levels -- the national, regional/provincial, and district. For the purposes of horizontal coordination, the various technical units at each level would be responsible to the manager of the Administration SMU at that level, who would utilize a Standing Committee comprised of the heads of the technical units to develop work programs, etc. These Administration SMUs would also be responsible for vertical coordination of the activities of the various technical SMUs. Thus, for example, the chief of the
Extension Service at the regional level should be responsible to the manager of the Administration Service at that level, not to the chief of the Extension Service at national level.

5.15 It should be understood that the number of SMUs at regional levels will vary according to the needs within specific provinces. In any event, the various technical SMU managers at the regional level should be responsible to a single senior officer for both technical and administrative links to the national level above and district levels below.

5.16 The preponderant number of technical support personnel within MAF and MNR should be located at the regional level. The only technical support personnel located within headquarters at the national level should be those whose specializations are so narrow that sufficient demand does not exist within individual provinces and a few others whose specialist input is required for strategic planning, sectoral planning, and/or coordination of cross-sectoral plans and activities with other GOSL ministries and agencies. The orientation at regional and national levels should not be focused on command and control. Rather, the orientation should be towards responding to client (district) initiatives.

(ii) Integration of IADPs

5.17 It is strongly recommended that the incorporation of the various IADPs -- through the distribution of their resources and transfer of responsibilities to provincial SMUs -- should not be delayed until the various termination dates of those projects, since the success of the decentralization of MAF and MNR, as discussed above, will depend on the resources -- management and technical staff as well as supporting facilities -- of the IADPs. Therefore, at the completion of Phase I -- i.e., by approximately July 1986 -- all IADPs should cease to exist as separate organizations. Therefore Phase I activities must include preparations for the transfer of those responsibilities and resources. The successful implementation of the pilot integration exercise in Eastern IADP scheduled for 1984 is critical to the success of the overall longer term process. During 1984, the integration of normal MAF extension staff into the Eastern IADP should be viewed as a pilot exercise directed towards the design of an effective process of integration for all other IADPs. Issues that would need to be resolved in this process include resolution of the differences in the incentive systems between MAF and the IADPs and clear definition of recurrent and developmental positions. It is recommended that the approach should be to equalize the basic salary structures and introduce performance bonuses instead of the present system of automatic "topping up" currently practiced in the IADPs. This measure should be supported by an improved system of upward mobility for competent staff. Staff occupying developmental positions should be placed on fixed-term contracts (for the duration of the project) and be given a gratuity at the end in lieu of pension benefits. This gratuity should reflect both length of service and an additional recognition of merit. Phase I of the implementation process should expand that process to all of the other IADPs. Foreign donor assistance scheduled in support of any IADPs beyond completion of Phase I should continue. However, such donor assistance should be channelled beyond Phase I to the appropriate SMUs.
(iii) **National Level Relationships**

5.18 **Agricultural and livestock extension.** As discussed above, improving the efficiency of extension services and redefining their functions should be one of MAF's highest priorities. That will require decentralization of the extension service with primary management responsibility at the regional level, while strengthening their links to research.

5.19 **Research.** In Sierra Leone, agricultural research has not in the past been efficiently or effectively designed, coordinated, managed, or applied. The result is that little effective agricultural research is currently under way and the extension services are left with only marginally improved techniques to recommend to farmers. Therefore, early action should be taken to implement the GOSL's plan to establish a National Agricultural Research Coordinating Council responsible for the drafting of a comprehensive National Agricultural Research Plan. The Council should be assisted by Provincial Agricultural Research Coordinating Committees.

5.20 **Provision of inputs.** MAF's intention to eventually transfer its responsibilities for provision of seeds, fertilizers, pesticides, and mechanical equipment to the private sector and/or parastatal organizations should be supported. However, it is also recognized that until the private sector's capacity is improved and other constraints negatively affecting the operation of market forces are removed, MAF will be required to continue some responsibility for the provision of inputs. Therefore, during that transition period, it will be necessary to exercise care not to create greater institutional capacity within MAF to perform temporary functions than is minimally necessary. It is also important to maintain complete separation between extension service personnel and those responsible for the provision of inputs and credit.

5.21 **Planning.** The planning function is one of the most important a line ministry should perform. The emphasis in planning should be on the formulation of policies and programs within the given national and sectoral framework of objectives, and resources. Thus, the proposed reorganization of the agricultural sector into SMUs includes an important emphasis on planning throughout the Ministry (or ministries) and at all levels. National level SMUs should shift their focus from the current responsibility for management of field operations to an emphasis on policy planning and the development of broadly defined implementation guidelines for SMUs at regional level. Within the framework of these guidelines, regional planning would involve the priority ranking of needs expressed by farmers and development of appropriate programs to meet these needs. Overall sectoral planning, monitoring and evaluation, data collection, etc. would be the responsibility of the Planning Unit within the National Administrative SMU. The design of an appropriate planning system integrated vertically from village to national levels and horizontally at each level should be a major activity during Phase I.

5.22 **Financial management.** The need for immediate action to improve the efficiency of the financial management system currently in force has been
noted by a previous report. 1/ It is recommended that -- as initial steps --
the proposals contained in that report be accepted, and that a study of the
means of reorganizing the financial management and accounting system for the
Ministry be undertaken. It should be noted that the creation of SMUs would
eventually require the further delegation of financial management responsi-
bilities to those units at all levels. Further, the efficiency of the
reorganized financial system will depend on improvements in efficiency in the
Ministry of Finance and in the Auditor General's Office.

(v) Technical Assistance and Training Requirements

5.23 Conventionally, training only addresses individual skill deficien-
cies. Unless very broadly defined to include technical assistance through on-
going counterpart arrangements, training does not normally address the
systemic nor organizational development aspects of organizational problems.
Appropriate management training can be an effective technique for achieving
improvement at both the organizational and individual levels. However, it is
unlikely to have a direct impact on systemic change. Further, for management
training to be effective, it must be directed toward achieving an improvement
in internal organizational efficiency and the ability to function effectively
within a changing environment. To achieve these aims, training needs to be
directed to the particular needs of an organization as a whole, use real
problems as the basis of learning activities, and enhance the knowledge and
skills of staff. Thus, training programs should emphasize on-the-job and in-
country short courses involving a critical mass of local decision-makers and
staff.

5.24 Although the effect of training is limited primarily to changing
organizational and individual behavior, technical assistance -- when provided
at high enough decision-making levels -- can have an effect on changing struc-
tures at the systems level as well. Thus, technical assistance should be a
primary part of donor financed assistance to the GOSL in its efforts to reor-
ganize and improve capacity within the agricultural sector. Unfortunately,
distinctions between different technical assistance modes (implementer, sub-
stitute, teacher, mobilizer) have seldom been recognized in the process of
project design. Choices between them have seldom been explicitly made and the
degree of fit between institution-building requirements and the type of
technical assistance actually provided has often been accidental.

Implementation

5.25 As discussed in para 5.08, the process of institutional reorganiza-
tion would be divided into three phases. For each phase, intermediate objec-
tives ("signposts"), the activities required to achieve those objectives, and
the resources required to carry out those activities should be identified. In
addition, the logic of the process approach requires that each phase be
planned and financed in sequence as discrete projects; with initial detailed
planning limited to Phase I. Detailed planning for Phase II should be
included as part of the process during Phase I and, in turn, planning for
Phase III should be part of the process during Phase II.

1/ Derek Wynne, "Review of Ministry of Agriculture and Forestry
5.26 The proposed objectives and actions for all three phases are summarized below:

Phase I (Three years)

Objectives: Merger of MAF and MNR, improvements in the efficiency of MANR and establishment of the basic organizational structure, initial decentralization of operations.

Actions:

(a) Establishment of a more efficient and flexible financial management system.

(b) An annual reduction of at least 10% in the expenditures on temporary workers (to be continued into Phase II, if necessary).

(c) Development of a Personnel Management System to include job descriptions, systems of incentives, training and career development.

(d) Design of provincial and district level planning and management systems.

(e) Development of an extensive training program of extension agents, management staff (at all levels) and specific technical staff.

(f) Establishment of a National Agricultural Research Coordinating Council with specific terms of reference to ensure coordination with the extension services.

(g) Integration of the IADPs.

(h) Stimulation of farmers interest in forming groups for extension, credit, marketing, etc., and responding to their expressed requirements.

(i) Privatization of management of Mechanical Services, and parastatals -- Gambia Mattru Oil Palm Company and Daru Oil Palm Company.

Phase II

Objectives: A complete decentralization of implementing functions to the regional level.

Actions:

(a) Implementation of the planning, management and personnel systems designed in Phase I, which should include a decentralized financial system, whereby the implementing SMU has control over the resources for its approved work program.
(b) Strengthening and expansion of the monitoring and evaluation system to cover all operations in terms of financial, economic, and management criteria.

(c) Continuation of training.

(d) Continuation of farmer group development efforts (into Phase III, as well).

(e) Completion of handover of credit functions to Rural Banks, Commercial Banks and possibly autonomous farmers' associations.

(f) Privatization of input supply functions.

Phase III

Objectives: Consolidation of the reorganized structure and strengthening of administrative and technical capabilities at the national level.

Actions:

(a) Assessment of the structure at each level in relation to reduction in costs, improvements in efficiency, numbers of functioning farmer groups, etc.

(b) Consolidation of the horizontally and vertically linked planning and implementation system down to the farmer level with effective two-way communications.

(c) Further strengthening of the management information system.

VI. A PROPOSED DEVELOPMENT STRATEGY

A. The General Strategy

6.01 In Chapter I the magnitude of the problems facing the Sierra Leonean economy was presented and it was argued that the recovery of the economy in the short to medium term depends almost entirely on the agricultural sector and to a great extent on the performance of smallholders. The analysis of the resources and the structures in Chapter II revealed that there is still considerable untapped potential in the sector - less than 10% of the potentially arable swamplands are cultivated, 50% of the tree crop potential remains untouched - but development is hindered by a number of constraints. The analysis of the major constraints in Chapters III-V indicates the need for a restructuring of key aspects of the sector - the system of incentives, the methods of production and the institutional services - before this potential can be realized.
6.02 However, the pervasive nature of some of the constraints (especially the institutional and technological) and the data limitations, dictate a cautious approach to any restructuring exercise. This implies that the restructuring process should be the gradual introduction of consistent policy packages with continuous evaluation of each package and its impact and appropriateness, followed by a corresponding reformulation of policy. In the meanwhile, there are immediate macroeconomic needs in terms of foreign exchange earnings and savings which have to be met from within the agricultural sector.

6.03 Therefore, the focus of the short-term strategy should be on the most efficient means (in terms of time and available resources) of increasing rice and oil palm production to substitute for imports and of stemming the decline in the sales of coffee and cocoa to the SLPMB. On the basis of the analysis in Chapters III and IV, it would appear that the most efficient means would be through incentive pricing policies and extension efforts to increase yields on existing areas through improved agronomic practices, seeds and planting materials. In the medium to the longer term, emphasis should shift to structural changes in the institutional and technological framework. Efforts should be directed at expanding the area under cultivation (under balanced ecological conditions), and diversifying the production base. More attention should be paid to livestock, fisheries and forestry, and the appropriate priorities identified in the various studies (paras 2.30-2.32) should be implemented. Inter-sectoral linkages with the industrial and services sectors should be further developed. The elements of such a sector strategy are outlined in Section B below.

6.04 The agricultural strategy proposed in this report aims not only at accelerating growth in agricultural production but also effecting a more equitable and sustainable distribution of incomes, based on a more effective mobilization, allocation, and application of internal resources. The proposed strategy would be in line with Government's proclaimed policy of growth and equity. It would help develop a sound economic foundation, reliable financial resources, and an effective institutional framework with which to provide support to less advantaged groups of the population. The removal of the urban bias in the pricing policies and improvements in the incentive framework for agricultural producers (predominantly smallholders) are major steps in that direction. These measures, combined with proposals on technological improvements and institutional reform with emphasis on farmers organization, will enhance their productive capacity. The proposed reduction in Government's direct intervention in the sector and its complete withdrawal from production activities would enable MAF and other agencies to attend to their basic responsibilities in areas of extension, planning and research.

6.05 A strategy for the agricultural sector is also closely linked to that (whether explicit or implicit) in relation to population growth. Projections of population growth and the corresponding demand for rice and supply under various assumptions are presented in Supporting Paper 1. Even with implementation of the various strategies for rice development (see Chapter IV and Supporting Papers 4 and 5) and an increase in the growth rate from the historical average of 1.8% to 2.6%, rice imports will continue to be sizeable. For the deficit to be eliminated (assuming present population growth and production growth of 2.6%) per capita consumption would have to be reduced to
the levels of the early 1960s - 86 kgs per annum compared with a 1982 level of 120 kgs (see Annex 1, Table 3). While recommendations have been made for encouraging the substitution of other foods for rice by appropriate consumer pricing policies as well as on policies to promote the production, marketing and preparation of other foods such as cassava, groundnuts, maize and sweet potatoes (see para 2.13); it should be recognized that substitution is limited by taste preferences and nutritional factors (in the case of cassava) and a reduction in consumption of the required magnitude (28%) may not be possible. Therefore, given these factors and the projected balance of payments situation, Sierra Leone may need to reconsider whether its present population growth trend is sustainable.

B. Elements of a Sector Strategy

6.06 The elements of the proposed strategy are discussed below in relation to the constraints they seek to relieve and the objectives to be achieved.

6.07 Policy measures to improve the incentive framework. These policies are discussed at greater length in Chapter III; only the main points are summarized here. The exchange rate is a key factor influencing the prices of the major crops and it is important that current policies in exchange rate adjustment should be continued and the adjusted border prices (of the traded commodities) be reflected in the prices received by producers. Another major factor affecting the export crops is the high rate of taxation (30%) on cocoa and coffee and if world market prices continue to decline, it could become necessary to reduce these taxes in order that the incentives for replanting and maintenance, and hence the long-term viability of these crops, could be maintained. The negative budgetary implications of such a measure could be partially and possibly totally offset by other factors. These include (i) the potential diversion from smuggling to increased supply to the SLPMB 1/; (ii) the possible reduction in expenditures in the agricultural sector that could be achieved through redeployment of excess labor and improved efficiency; and (iii) the proposed budgetary support (para 6.15) for the period 1985-87 when the world prices of coffee and cocoa are projected to be at their lowest in the next ten years. The operations of the Pricing Committee should be formalized, and it should be supported by sound technical and analytical advice from the SLPMB and MAF (para 3.19). The proposals for announcing annual prices at the appropriate time should also be implemented - producer rice prices at the beginning of the planting season, coffee and cocoa prices before June 30, oil palm prices in keeping with market developments. The coffee and cocoa prices should be maintained at the same level throughout the season and the feasibility of minimizing the magnitudes of annual fluctuations through the use of formula based on weighted moving averages should be examined. The implementation of these measures would require replenishment of the stabilization fund which could be achieved through total appropriation of

1/ The SLPMB estimates exports of only 6,500 tons of coffee and 9,000 tons of cocoa for 1982/83, compared to potential averages of 11,500 and 9,500 tons respectively (see para. 2.16).
the profits of the SLPMB for this purpose. The proposed SLPMB/NAPCO program for assisting farmers in the marketing, processing and storage of rice should be implemented as quickly as possible, thereby contributing to higher producer prices and at the same time stabilizing consumer prices.

Technological Improvements

6.08 In the short-term, emphasis should be on widespread dissemination of improved food agronomic packages - improved husbandry, seeds, fertilizers etc., for all cropping systems. The pilot programs recommended in Chapter IV should be introduced to test acceptance of the alternative ways of relaxing the constraints on water control, land preparation, harvesting, and processing. If these programs gain widespread acceptance, the emphasis in the medium to longer term should be on increasing the share of rice production in the higher yielding inland valley swamps and riverain grasslands. Policies in support of such a strategy would include actively pursuing the appropriate research programs. Since one of the objections to swamp cultivation is that it does not provide the same protection against risk as the mixed upland cropping system, research should be directed at developing permanent cropping systems of other food and cash crops for the uplands surrounding the swamps in sustainable rotations with tree crops on the upper slopes. The research programs (on food tree crops, cassava etc.) outlined in Supporting Papers 4 and 6 would reinforce the efforts of ACRE and LRSP in this area and explore means of diversifying the production base.

6.09 Other supporting policies would include the expansion of the pilot and on-going programs with emphasis on work oxen in the North, on power tillers in the mangrove swamps and the inland valley swamps of the South and East, and on tractor cultivation in the riverain grasslands. A key Government priority should be the privatisation of mechanisation services to the sector. This could involve the establishment of private companies with some Government equity participation to ensure supply of imported machinery and spare parts, and a basic repair service. In addition, as well as ownership of machinery by large farmers or farmer groups some steps might be taken to encourage small contractors. If the hydrological survey (para 4.12) indicates technical and economic potential for large scale rice operations in the Riverain Grasslands, then a cautious start should be made to develop about 10,000 hectares (about 10% of the uncultivated area). The policy should be to encourage private sector participation in such operations; further public sector involvement should be limited to provision of infrastructure with cost recovery through appropriate taxing policies. Large scale private sector operations may be justified on the grounds that: (i) mechanical cultivation in the area is the most efficient of the rice ecologies in the country (Table 3.1), (ii) population density is low, nearly 100,000 ha is uncultivated and (iii) it is the only means of achieving a quantum increase in rice production in the medium term. (See Supporting Paper 4).

6.10 Policies to promote agro-industrial linkages should focus upon:

- reorganization and improvement of the oil palm processing industry, private sector participation and establishment of linkages with soap and margarine manufacturing (Supporting Paper 5);
- feasibility of expansion of the palm kernel refining capacity (para 4.30);
- ensuring availability of spare parts for rice processing;
- rehabilitating the citrus and fruit plant industry;
- expanding local capability to manufacture and market agricultural equipment (para 4.33);
- improving village-level capacity for processing oil palm and cassava (paras 4.26 and 4.27); and
- developing cottage industries.

Institutional Reform

6.11 The institutional strategy should be predicated on a restructuring of the existing organizations and the development of farmer organizations to improve the overall efficiency of services in the sector. It is recommended that this strategy should be implemented over three phases. The salient policy measures in each phase are outlined in para. 5.26. In Phase I efforts should be directed at improvements in financial and administrative management, execution of an extensive training program, and development of farmer organization. In Phase II, efforts would be aimed at consolidating the measures introduced during Phase I, analyzing their impact and developing better linkages between the various levels in the structures. Phase III would be directed primarily to reorganization of the infrastructure at the national level, based on the developments during the earlier phases at all levels.

C. An Action Program for the Sector

6.12 On the basis of the priority requirements and the analysis of the nature of the constraints, the recommendations in this report may be classified into two categories: (i) the short term, which covers those actions that need to be initiated immediately; and (ii) the medium to longer term actions that address the restructuring of the sector.

(i) The Short-Term Action Program

(a) Actions for Improvements in the Incentive Structure

The actions in this program are aimed primarily at the recovery and consolidation of the sector, they include:

- formalizing the operations of the Pricing Committee and timely announcement of prices (para 3.18);
introduction of improved analytical foundations in the determination of pricing policies, including market and farm level analysis, a flexible approach to export and import taxes (para 3.18); and

implementation of a joint SLPMB/IADP program of assistance to farmer groups in marketing (paras 3.16 and 3.17).

(b) Actions in Support of Technological Improvements

- intensified dissemination of improved agronomic practices, tools, implements, etc., for both upland and crop production (paras 4.06, 4.07, 4.23);

- rationalization and improvement of the production, distribution and pricing of improved seeds, especially for rice (para 2.38);

- improvement of seed gardens and nurseries to upgrade the quality and increase the supply of perennial crop planting material (para 2.23);

- pilot programs to promote increased rice production to higher yielding inland swamps and riverain grasslands through improved water control methods and development of appropriate cropping systems (paras 4.09-4.12); and

- introduction of pilot programs to test alternative ways of relaxing technological constraints on land preparation (paras 4.14-4.18), harvesting (para 4.23) and crop processing (paras 4.25-4.27).

(c) Actions on Institutional Reform

- implementation of financial reorganization (para 5.24);

- initiation of the process of integrating IADPs with the Ministry commencing with the integration of services in the Eastern Province (para 5.18);

- execution of an extensive training program (para 5.25);

- implementation of improved decentralized management systems in MAF and MNR (paras 5.06-5.08 and 5.28);

- strengthening the development of farmer organizations (paras 5.09-5.11);

- establishment of the Research Coordination Council and improvement of the extension research linkages (paras 2.35, 4.35 and 5.21);
- promotion of private participation in parastatals, etc. (para 5.02); and
- privatization of mechanization services to the sector (paras 4.19 and 6.06).

(ii) The Medium to Longer Term Program

The actions in this program which would be geared at more in-depth restructuring of the sector include:

- implementation of larger scale programs, where justified, based on the results of above pilot efforts in rice production in swamps and riverain grasslands, land preparation, harvesting and crop processing;
- implementation of research results with respect to improved cropping systems and diversification of the production base;
- expansion of agro-processing activities;
- further streamlining of the ministerial services; and
- introduction of measures to deal with land tenure issues (paras 2.40-2.43).

D. Implications of the Proposed Strategy for External Assistance

6.13 In the past, the major part of external assistance was channelled to the regional IADPs and easily definable bottlenecks, with the various donor agencies operating within the enclaves of their respective project(s). While external assistance will continue to be necessary to support the provision of regional services, the proposed strategy outlined above requires that additional external assistance in the near future should be utilized primarily to address the major constraints within a sectoral framework. All projects/programs should be designed to be consistent with the proposals for the restructuring of the institutional, technological, incentive framework; investments should be focused on the major sources of growth - the cropping sub-sector and in particular the specific programs identified for rice, oil palm and coffee based on regional comparative advantage. It therefore follows that there is a need for considerably more coordination among the various donors than has been apparent in the past. In short, a strategic, as opposed to a tactical program of assistance is needed.

6.14 The operations of a Working Group of the major donors should be formalized. Attempts have been made in this direction during the preparation of the Ag. Dev. V project on the reorganization of services and during the sector review mission. This Working Group could be the means of achieving the coordination which is required at two levels: (a) at the level of formulating investment policies and assessing outcomes in relation to the sectoral goals,
and (b) at the level of implementation and resolution of the problems that arise during the process. A major issue that should be pursued at the start is the feasibility of negotiating a five-year plan of External Assistance linked to the necessary policy reforms with the objectives and "sign posts" clearly identified. Donor programming and other constraints are recognized but a plan of this nature would considerably facilitate the implementation of a consistent and viable sector strategy.

6.15 The Bank should consider broadening its support to the agricultural sector in line with the recommendations in this report to reinforce current operations and ensure the long-term viability of their achievements. Such support should be provided for the following:

(a) Sectoral adjustment support through the provision of foreign exchange to finance the operating costs of ongoing agricultural programs, and essential production inputs. This type of support is warranted by the shortfalls in agricultural export earnings, the recent increase in rice imports, and the lag before production and consumption can adjust to the policy change, such as the recent exchange rate and producer price adjustments;

(b) support for selected short-term actions towards technological improvements (as listed in para 6.11 (i)(b) above); and

(c) support for institutional strengthening (para 6.11(i)(c)).

The assistance should be closely linked to further policy reform such as improvements in the allocation of budget resources to the sector, institutional reform, and to the maintenance of an incentive structure for producers.

E. Further Work

6.16 This Sector Review has been a first step in the process of analysis of and policy formulation for the agricultural sector. The major constraints have been investigated further and recommendations have been made on policies to alleviate their most limiting aspects. Partial analysis of these policies has been carried out in terms of returns to farmers and economic efficiency in the use of resources (other factors assumed constant). This analysis is adequate for the urgent short-term priorities of implementing policies to stem the decline in production and identifying the direction of change over the long run. The next step in the analysis should be the development of a framework to analyze the impact of the short-term policies as well as the long-run potential impact of the proposed sectoral strategy on the economy as a whole. This analytical framework should also be the means for determining the necessary fine tuning required for the broad policies (such as exchange rate and taxation policies) identified during the review, as well as the potential for expansion of the pilot programs recommended for testing major technological changes. The most appropriate approach is probably a three sector -- agriculture, mining, and "other" -- macromodel with the agricultural sector disaggregated into two subsectors -- food crops and tree crops. With respect
to the data requirements for the agricultural part of the model, the present data and proposed collection and analysis of the M & E Units of MAF and the EPD of the SLPMB (para 3.19) would provide some of the data input but a number of additional studies would be necessary, these include:

(1) a study of the structure and operations of the labor market;

(2) expansion of the demand study on rice and palm oil initiated under Credit 970 SL;

(3) a study of supply elasticities for rice and the export crops, taking into account conflicting labor demand, relative prices, etc.

6.17 Institutional reform is another key area in which more macro-analysis of the problem is required. The problems of MAF and MNR -- overstaffing, inappropriate priorities, and poor incentives -- are common throughout the Civil Service structure. The current budgetary problems of the Government and the low productivity of these services require that a study should be carried out and a program developed for the overall restructuring of the Civil Service. Such a program would reinforce the institutional reform program recommended for MAF and MNR.
### SIERRA LEONE

#### AGRICULTURAL SECTOR REVIEW

**LAND DISTRIBUTION BY CROP**

<table>
<thead>
<tr>
<th>Crop Description</th>
<th>1971(^1) (ha)</th>
<th>1973(^2) Estimate (ha)</th>
<th>1982 Rough(^3) (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>327,060</td>
<td>61.3</td>
<td>350,000</td>
</tr>
<tr>
<td>upland rice</td>
<td>243,302</td>
<td>45.6</td>
<td>250,000</td>
</tr>
<tr>
<td>swamp rice</td>
<td>83,758</td>
<td>15.7</td>
<td>100,000</td>
</tr>
<tr>
<td>Tree crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>(116,370)</td>
<td>(21.7)</td>
<td>132,000</td>
</tr>
<tr>
<td>coffee</td>
<td>71,311</td>
<td>13.3</td>
<td>75,000</td>
</tr>
<tr>
<td>cocoa</td>
<td>45,059</td>
<td>8.4</td>
<td>47,000</td>
</tr>
<tr>
<td>citrus, rubber, coconut, etc.</td>
<td>--</td>
<td>--</td>
<td>10,000</td>
</tr>
<tr>
<td>Root crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>28,564</td>
<td>5.3</td>
<td>29,000</td>
</tr>
<tr>
<td>cassava</td>
<td>16,678</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>cocoyam</td>
<td>4,452</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>sweet potato</td>
<td>7,022</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>chinese yams</td>
<td>412</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Grain crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>22,318</td>
<td>4.3</td>
<td>22,000</td>
</tr>
<tr>
<td>guinea corn</td>
<td>4,754</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>fundi</td>
<td>1,371</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>millet</td>
<td>5,707</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>maize</td>
<td>10,486</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Pulses/oil crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>15,933</td>
<td>3.0</td>
<td>16,000</td>
</tr>
<tr>
<td>groundnut</td>
<td>13,822</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>broad beans</td>
<td>317</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>benniseed</td>
<td>1,794</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Other crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area</td>
<td>23,665</td>
<td>4.4</td>
<td>14,000</td>
</tr>
</tbody>
</table>

**Total Cultivated Area**

- 533,910
- 100.0
- 563,000
- 100

**Sources:**

3/ Sector Review Mission estimates based on discussions with FAO/IA.SP and Agricultural Projects Staff.
### Major Environments for Paddy Rice Cultivation

<table>
<thead>
<tr>
<th>Environment</th>
<th>Flooding Regime</th>
<th>Cultivation Practices</th>
<th>Total Cultivable Area (ha)</th>
<th>Cultivated Area in 1970/71 (%)</th>
<th>Cultivated Area in 1981/82 (%)</th>
<th>Estimated Cultivated Area (ha)</th>
<th>Average Yield (t/ha)</th>
<th>Potential Yield (t/ha)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mangrove</td>
<td>Tidal to depths of 60 cm</td>
<td>One crop of paddy rice during the rainy season</td>
<td>200,000</td>
<td>19</td>
<td>15.41</td>
<td>8</td>
<td>20,000</td>
<td>1.1 - 1.5</td>
<td>Dry season soil salinity and acidity</td>
</tr>
<tr>
<td>Ballard</td>
<td>Prolonged rainy season flooding to depths of 1 m</td>
<td>One crop per year; land mechanically prepared</td>
<td>120,000</td>
<td>11</td>
<td>3,350</td>
<td>3</td>
<td>9,000</td>
<td>0.9 - 1.3</td>
<td>Extremely acid soil of low fertility</td>
</tr>
<tr>
<td>Riverine</td>
<td>Variable rainy season flooding to depths of 0.5 to 2 m</td>
<td>One crop of paddy or floating rice per year; land mechanically prepared</td>
<td>110,000</td>
<td>10</td>
<td>7,120</td>
<td>6</td>
<td>8,000</td>
<td>1.2 - 2.4</td>
<td>Difficulties for controlling flood along major rivers</td>
</tr>
<tr>
<td>Inland Valley Swamp</td>
<td>Short to prolonged rainy season flooding to depths of 0.5 to 1 m</td>
<td>One or two crops of paddy rice depending on degree of water control and drainage</td>
<td>630,000</td>
<td>60</td>
<td>57,877</td>
<td>9</td>
<td>63,000</td>
<td>1.1 - 1.8</td>
<td>Relatively fertile soils. Easily reclaimed by hand methods.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>1,060,000</td>
<td>100</td>
<td>83,758</td>
<td>8</td>
<td>100,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** UNDP/FAO LRSP

1/ Potential yields under varying assumptions on input levels, water management etc.

2/ 3.0 tons/ha single cropping, 8.0 tons/hectare double cropping.
### SIERRA LEONE

#### AGRICULTURAL SECTOR REVIEW

Production and Imports of Rice

(in thousand metric tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Paddy Production</th>
<th>Rice Production</th>
<th>Imports</th>
<th>Total Supply</th>
<th>Population ('000)</th>
<th>Per Capita Cons. (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>264.0</td>
<td>150.3</td>
<td>4.2</td>
<td>154.5</td>
<td>1,383.0</td>
<td>77.9</td>
</tr>
<tr>
<td>1962</td>
<td>270.0</td>
<td>154.1</td>
<td>7.3</td>
<td>161.4</td>
<td>2,033.0</td>
<td>89.0</td>
</tr>
<tr>
<td>1963</td>
<td>315.0</td>
<td>179.4</td>
<td>21.0</td>
<td>200.4</td>
<td>2,084.0</td>
<td>96.2</td>
</tr>
<tr>
<td>1964</td>
<td>331.0</td>
<td>188.5</td>
<td>0.5</td>
<td>189.0</td>
<td>2,136.0</td>
<td>88.4</td>
</tr>
<tr>
<td>1965</td>
<td>373.0</td>
<td>212.4</td>
<td>12.9</td>
<td>225.3</td>
<td>2,189.0</td>
<td>102.9</td>
</tr>
<tr>
<td>1966</td>
<td>399.0</td>
<td>227.2</td>
<td>35.1</td>
<td>262.3</td>
<td>2,244.0</td>
<td>116.9</td>
</tr>
<tr>
<td>1967</td>
<td>434.0</td>
<td>247.2</td>
<td>24.2</td>
<td>271.4</td>
<td>2,300.0</td>
<td>118.0</td>
</tr>
<tr>
<td>1968</td>
<td>468.0</td>
<td>266.5</td>
<td>17.2</td>
<td>283.7</td>
<td>2,358.0</td>
<td>120.3</td>
</tr>
<tr>
<td>1969</td>
<td>426.0</td>
<td>242.6</td>
<td>12.6</td>
<td>255.2</td>
<td>2,417.0</td>
<td>105.5</td>
</tr>
<tr>
<td>1970</td>
<td>507.0</td>
<td>288.7</td>
<td>44.8</td>
<td>333.5</td>
<td>2,477.0</td>
<td>134.6</td>
</tr>
<tr>
<td>1971</td>
<td>458.0</td>
<td>260.8</td>
<td>27.5</td>
<td>288.3</td>
<td>2,539.0</td>
<td>113.5</td>
</tr>
<tr>
<td>1972</td>
<td>500.0</td>
<td>284.8</td>
<td>5.2</td>
<td>290.0</td>
<td>2,603.0</td>
<td>111.4</td>
</tr>
<tr>
<td>1973</td>
<td>477.0</td>
<td>271.7</td>
<td>43.7</td>
<td>315.4</td>
<td>2,668.0</td>
<td>118.2</td>
</tr>
<tr>
<td>1974</td>
<td>473.0</td>
<td>269.4</td>
<td>45.0</td>
<td>314.4</td>
<td>2,735.0</td>
<td>115.0</td>
</tr>
<tr>
<td>1975</td>
<td>479.0</td>
<td>272.3</td>
<td>-</td>
<td>272.8</td>
<td>2,803.0</td>
<td>97.3</td>
</tr>
<tr>
<td>1976</td>
<td>490.0</td>
<td>279.1</td>
<td>-</td>
<td>279.1</td>
<td>2,873.0</td>
<td>97.1</td>
</tr>
<tr>
<td>1977</td>
<td>512.0</td>
<td>291.6</td>
<td>14.0</td>
<td>305.6</td>
<td>2,945.0</td>
<td>103.8</td>
</tr>
<tr>
<td>1978</td>
<td>539.0</td>
<td>306.9</td>
<td>-</td>
<td>306.9</td>
<td>3,019.0</td>
<td>-</td>
</tr>
<tr>
<td>1979</td>
<td>543.0</td>
<td>310.2</td>
<td>71.2/3</td>
<td>381.2</td>
<td>3,094.0</td>
<td>123.2</td>
</tr>
<tr>
<td>1980</td>
<td>550.0</td>
<td>313.6</td>
<td>71.0/3</td>
<td>384.6</td>
<td>3,171.0</td>
<td>121.3</td>
</tr>
<tr>
<td>1981</td>
<td>545.0</td>
<td>310.4</td>
<td>54.0</td>
<td>364.4</td>
<td>3,256.8</td>
<td>111.9</td>
</tr>
<tr>
<td>1982</td>
<td>545.0</td>
<td>310.4</td>
<td>91.7</td>
<td>402.1</td>
<td>3,345.6</td>
<td>120.2</td>
</tr>
</tbody>
</table>

Source: GOPA Study, Sierra Leone, 1977, FAO Rice Development Project, Ministry of Agriculture and Forestry and SLPMB.

1/ 15% for seed and wastage and 67% milling rate.
2/ Total imports (91,000 tons) minus carryover stocks (20,000).
3/ Total imports (51,000 tons) plus carryover stocks (20,000).
CHART 1
PROPOSED CORE ORGANIZATION:
DISTRIBUTION AND RELATIONSHIPS OF SMUs

NATIONAL

Ministry
Office of the Minister

National Administration
SMU

Standing Committee

National Agriculture
Administration SMU
National Forest & Wildlife
Conservation Support
SMU
National Commercial
Services Support
SMU
National Agricultural
Support SMU
National Livestock
Support SMU

National Mechanical
Welfare SMU

National Fisheries
Administration
SMU

Retail Production
Support SMU

National Veterinary
Support SMU

National Marine
Fisheries Support
SMU

Performance
Evaluation
Management
Unit

PROVINCE

Provincial Administration
SMU

Standing Committee

Provincial Agriculture
Administration SMU
Provincial Forest & Wildlife
Conservation Support SMU
Provincial Commercial
Services Support SMU
Provincial Agricultural
Support SMU
Provincial Livestock
Support SMU

Provincial Mechanical
Welfare SMU

Provincial Fisheries
Administration SMU

Provincial Animal
Production Support
SMU

Provincial Veterinary
Support SMU

Provincial Marine
Fisheries SMU

PROVINCE

District Administration
SMU

Standing Committee

District Agriculture
Administration SMU

District Forest & Wildlife
Conservation Management
Section

District Commercial
Services Support SMU

District Agricultural
Support SMU

District Livestock
Support SMU

District Mechanical
Welfare SMU

District Fisheries
Administration SMU

District Animal
Production Support
SMU

District Veterinary
Support SMU

District Marine
Fisheries Section

DISTRICT

Chiefdom

Village

Farmers Organization

1 If MAF & MNR are merged into MAANR, Administration SMUs for all four core subdivisions of MAF & MNR will also be combined as illustrated here.
2 However, until such time as they are merged - if they are ever merged - Agriculture & Forestry should have one Administration SMU at each level.
3 Until such time as MAF & MNR are merged - if they are ever merged - each Ministry should have a separate Performance Evaluation Management Unit.
4 Provincial & District level Standing Committees will not be necessary unless the four core subdivisions are merged into a single Ministry.
5 These provincial SMUs will only be established where necessary.
6 These district sections will only be established where there is sufficient activity to justify the costs.
SIERRA LEONE TENTATIVE ECOCLOGICAL SUBAREAS

- Subarea boundaries
- Provincial boundaries
- International boundaries

Swamp areas selected by FAO for detailed studies

National capital
Provincial capitals

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