

Agricultural Sector Assessment Report for Sierra Leone

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P R E F A C E

This assessment of agriculture in Sierra Leone was originally prepared for the Africa Bureau, United States Agency for International Development, and USAID/Freetown under work order No. 6 of Indefinite Quantity Contract N. AID/SOD/FDC-C-0217, and is based largely on field work carried out in Sierra Leone from April 17 through June 7, 1980. The contractor was the Consortium for International Development (CID), Logan, Utah. Within CID, New Mexico State University took the lead on the project, assisted by the University of Arizona and Montana State University. The CID contract team was supplemented with specialist assistance from AID's Regional Economic Development Services Office (REDSO), Abidjan, Ivory Coast.

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The CID report has been edited and revised by USAID/Freetown and incorporates input from USAID as well as several GOSL institutions, primarily the Ministry of Agriculture and Forestry. Other cooperating agencies are listed following the Summary of Report and Recommendations. The participation of farmers, market women and other individuals involved in agricultural production, marketing and processing in Sierra Leone is also gratefully acknowledged.

SUMMARY OF REPORT AND RECOMMENDATIONS

Agriculture is a key industry in the economy of Sierra Leone, contributing one third of Gross Domestic Product and 40 percent of the value of exports. Of the nation's 3.4 million people, 65-75 percent are members of rural farm households. Agricultural development in Sierra Leone has been constrained by the following factors, which pervade the social and economic system of the country:

1. A low level of government investment and price incentives for agriculture.
2. The lack of an effective infrastructure to deliver capital inputs and credit to farmers and to market farm products.
3. A monopsonistic buying structure for cash crops that has been used to extract large amounts of tax revenue without corresponding investment in research, extension, and development.
4. The lack of applied research in agriculture and an ineffective extension service.

Rice is the mainstay of the agricultural economy and efforts to increase production need to be intensified. Currently, all rice cultivation systems are socially unprofitable and most are privately unprofitable due to rising labor wage rates and low producer prices. Rice imports have increased in recent years. The portion of the rice crop commercialized (now about 25 percent) is largely a function of in-kind debt repayment obligations and will be difficult to increase until the cost-return relationship gives farmers greater production incentive.

Both technical and economic research is needed, not only for rice, but for the complementary crops grown simultaneously or in sequence with rice. There is a lack of farming technology packages for rice and for combining rice with other crops, particularly on the uplands. Even though imported rice is currently cheaper than the social cost of producing rice in Sierra Leone, increasing rice production must receive top priority by policy makers.

Coffee and cocoa are important foreign exchange earners and are becoming more so as diamond exports decline. Presently, there is a lack of effective incentives to induce cash crop producers to increase production and to deliver the products to the Sierra Leone Produce Marketing Board. Cash crop producers are, for the most part, also rice producers. To assure food for the family, they give first attention to rice even though coffee and cocoa may yield higher returns to their labor. There is potential for significant increases in coffee and cocoa production through rather simple improved husbandry practices, but the realization of this potential will require extension education efforts in addition to price incentives. Development subsidies are necessary to foster new plantings.

The current agricultural development policy in Sierra Leone is focused on the Integrated Agricultural Development Projects (IADPs). These projects are area specific and financed by outside donor agencies. They attempt to take a broader, rural development approach by including feeder road and well construction components in addition to crop and livestock production efforts. They also are designed to deliver capital inputs and credit as well as extension education services. Their success to date has been variable. More IADPs are in the planning stages, and by 1983 they will cover some 85 percent of the total nation. However, even when fully implemented, they are projected to service only 20 percent of the farmers in Sierra Leone.

Agricultural development in Sierra Leone suffers from an ineffective extension service. The Ministry of Agriculture and Forestry is the oldest and largest organization in extension. Lack of transport for their field personnel precludes effective contact with farmers. Recently, with the advent of the IADPs, which have their own extension agents, there is duplication of effort and fragmentation of services. A major organizational overhaul and realignment is being discussed. Effective field agents are a must if farmers are to learn new practices and gain trust in government programs and personnel.

Two major areas emerged from the study as top priority for enhancing agricultural development in Sierra Leone. They are (1) a program of agricultural data collection, processing, and dissemination for research and policy making, and (2) a program of applied technical and economic research on rice and complementary crops. Of somewhat lesser priority is research on cash crops.

Other more specific programs of high priority that would require less funding include: a goat improvement project; an inland small fish pond project; a vegetable seed multiplication and distribution project; and an extension training project in specific areas such as coffee, cocoa, rice, legumes, tubers, fish, small ruminants, etc.

In the policy area, it is recommended that the government of Sierra Leone make greater investments in the agricultural sector; improve their ability to tax sources outside the agricultural sector; eliminate capital input subsidies; foster a system of effective credit and capital input delivery; promote farmers' associations; increase the official farmgate price of rice and assure that producers receive it; and strive to gain the trust of the nation's farmers so that the effectiveness of all policies can be enhanced.

AGENCIES PROVIDING KEY RESPONDENTS AND OTHER CONTACTS

Ministry of Agriculture and Forestry
Ministry of Natural Resources
Ministry of Development and Economic Planning
Ministry of Health
National Authorizing Office
Northern Integrated Agricultural Development Project
Eastern Integrated Agricultural Development Project
Koinadugu Integrated Agricultural Development Project
Sierra Leone Produce Marketing Board
Bank of Sierra Leone
National Development Bank
National Cooperative Development Bank
National Credit and Cooperative Society
Rokupr Rice Research Station - UNDP Project
Njala University College
Fourah Bay College
Farmers of Sierra Leone
Market Women of Sierra Leone
Agricultural Processing Industries
World Bank
Food and Agricultural Organization
ACRE Project
Peace Corps
Maboie Fruit Company
Daru Oil Palm Estate and Mill
Torma Bum Rice Authority

ACRONYMS

ACRE	Adaptive Crop Research and Extension
BSL	Bank of Sierra Leone
CA	Chief Agriculturist
CARE	Cooperative for American Relief Everywhere
CID	Consortium for International Development
CUNA	Credit Union National Association
EEC	European Economic Community
EIADP	Eastern Integrated Agricultural Development Project
FAO	Food and Agriculture Organization
GOSL	Government of Sierra Leone
IADP	Integrated Agricultural Development Project
IITA	International Institute of Tropical Agriculture
IMF	International Monetary Fund
KIADP	Koinadugu Integrated Agricultural Development Project
LRSP	Land Resources Survey Project
MAF	Ministry of Agriculture and Forestry
MDEP	Ministry of Development and Economic Planning
MH	Ministry of Health
MNR	Ministry of Natural Resources
NAO	National Authorizing Office
NCDB	National Cooperative Development Bank
NDB	National Development Bank
NIADP	Northern Integrated Agricultural Development Project
NUC	Njala University College
OAU	Organization of African Unity
PEMSU	Project Evaluation, Monitoring and Services Unit
REDSO/WA	Regional Economic Development Services Office/West Africa
RRRS	Rokupr Rice Research Station
SLPMB	Sierra Leone Produce Marketing Board
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WARDA	West African Rice Development Association

EXCHANGE RATES AND MEASURE UNITS

Exchange Rates:

Currency Unit: Leone (Le) = 100 cents

Le 1.00 = \$1.04 (May 1980)

Measures, Weights, and Conversion Factors

1 hectare (ha) = 2.47 acres

1 kilogram (kg) = 2.20 pounds

1 ton (t) = 2204 pounds

1 ton (t) = 37 bushels (rice)

1 cup of rice (at retail) = 9.5 ounces of milled rice

Notes

The metric system is used throughout the report except in a few instances where it is not common in Sierra Leone. Tables 7-8 through 7-11 are based on acres in line with their source documents. All references to tons are metric tons.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STATEMENT

In 1977, the United States Agency for International Development (USAID) re-established a bilateral assistance program in Sierra Leone after a seven year hiatus. The country meets two important criteria for such assistance: a low per capita income and a stated commitment to agricultural development (MDEP 1975).

The 1981 Annual Budget Submission states that development assistance will be primarily focused on the country's agricultural sector. USAID's current assistance program in Sierra Leone includes the five-year Adaptive Crop Research and Extension Project to identify and test improved crop technology and extension methods for delivery to the small farmers of the country. On a lesser scale, there is assistance for rural roads, credit, data collection, and agricultural extension training.

1.2 OBJECTIVES

The primary objective of the Agricultural Sector Assessment (ASA), of which this report is a result, was a thorough review of the total agricultural sector in Sierra Leone that would:

1. Serve as a basis for the design, review and approval of new USAID projects given the Agency's program emphasis on small farmers and landless laborers and the constraints that prevent them from increasing their productivity and real incomes.
2. Identify policies and projects for development of the agricultural sector with high potential impact relative to explicit and implied goals of the Government of Sierra Leone (GOSL).

1.3 SCOPE

The agricultural sector is defined as including all field crops, cash crops, livestock, forests and inland fresh water fisheries. To the extent permitted by available information, each commodity sub-sector was examined in its entirety, i.e., from basic inputs through primary production, processing, distribution, and consumption.

The assessment was constrained by the availability of secondary data and by the time afforded for first hand collection of information by team personnel. Only minor primary data collections were possible in the time allocated; however, in some instances it was possible to update existing sources using newer secondary data.

It was not considered within the scope of the assessment to build or recommend a strategy for agricultural development in Sierra Leone. However, the impact of some existing and potential programs and policies on GOSL goals were assessed, and various options were outlined, including some suggested priorities.

For the most part, the assessment considered the period of time since 1975. The first development plan was prepared for the period 1975-79 and the data base since 1975 seemed to be more reliable.

1.4 GENERAL PROCEDURES

Given the highly descriptive nature of the study, emphasis was placed on collecting and reviewing all of the available information on the agriculture of the country, rather than on generating new data. In several cases, previous analytical work was updated using current and projected factor and product prices. The review of published materials was broadened through interviews with a wide range of people involved in agriculture, from government officials to individual farmers and extension workers. These interviews provided insights that would be difficult to obtain through reviews of publications, particularly in the area of policymaking and program evaluation. Recommendations for programs and policies were based on conclusions drawn from existing literature and judgement analysis.

The descriptive approach used defines agriculture as a group of commodity sub-sectors. Each sub-sector was viewed as a set of production and consumption marketing activities. The procedure was to identify the nature of activities and participants at each stage in the process, from basic input to primary production through consumption. This method is particularly helpful in identifying data gaps. It also permits the description of the subsistence and commercial sectors simultaneously.

1.5 COOPERATING AGENCIES

The ASA enjoyed most favorable interest and response from many agencies. The Embassy staff deserves much credit for laying a good foundation for support prior to the team's arrival. The principal GOSL support came from the Project Evaluation Monitoring and Services Unit of the Ministry of Agriculture and Forestry (MAF). Not only did they put their entire library at the team's disposal, but they also provided two research assistants for the last month of the study. In addition, they assisted by arranging appointments with key personnel of the Eastern, Northern and Koinadugu Integrated Agricultural Development Projects.

The MAF also provided data inputs from the Land Resources Survey Projects group and the Chief Agriculturist and his assistants responsible for projects and the extension service.

Generous assistance was also given by the National Authorizing Officer, the Ministry of Natural Resources and the Ministry of Development and Economic Planning, the latter providing a full time research assistant. Additionally, interviews with personnel at the Bank of Sierra Leone, the Sierra Leone Produce Marketing Board and the National Development Bank elicited valuable information.

The faculty of the University of Sierra Leone at both Njala and Fourah Bay campuses were key respondents.

USAID provided both logistical and professional personnel inputs without which the study would not have been possible. They also arranged for the assistance of several specialists from the Regional Economic Development Services Office/West Africa.

CHAPTER 2

PHYSICAL ENVIRONMENT FOR AGRICULTURE

2.1 GEOGRAPHIC CONDITIONS2.1.1 Location

Sierra Leone is situated on the southwest coast of West Africa between 7° and 10° north of the equator. It is bordered by Guinea on the north and east, Liberia on the southeast and the Atlantic Ocean on the west and southwest. The country's total area is 72,300 square kilometers (27,900 square miles), just slightly smaller than South Carolina.

2.1.2 Physical Characteristics

There are four primary physical regions in Sierra Leone: the coastal plains, the interior plains, the plateaus, and the hills and mountains. These regions and their major components are illustrated in Map 2-1.

The coastal plains stretch inland from the Atlantic Ocean for a distance of between 25 and 50 kilometers. This region comprises 10,450 square kilometers (15 percent of the country's total area) and is made up of estuarine mangrove swamps, alluvial flood plains and coastal terraces. Elevation is generally less than 40 meters.

The coastal plains rise gradually into the interior plains, the largest physical region, covering 31,400 square kilometers and accounting for 43 percent of the country. The plains are gently rolling with elevations ranging between 40 and 200 meters. In the region are found the bolilands, seasonally flooded lowlands extending south from the Guinea border as far as 200 kilometers, with a width of up to 50 kilometers.

The plateau region covers 15,750 square kilometers (22 percent of total) and includes high plains and rolling plains and hills. The plateaus are located in the northeast and southeast section of the country.

The hills and mountains region covers 14,700 square kilometers (20 percent of total) with elevations ranging to 2,000 meters. The most striking examples of these high relief areas are the Freetown peninsula and the Loma Mountains in the northeast.

2.2 ENVIRONMENTAL CONDITIONS2.2.1 Climate

Sierra Leone enjoys a tropical savanna climate with distinct dry and wet seasons. The rainy season lasts from May through November, when most areas receive over 80 percent of their precipitation. Map 2-2

shows annual precipitation patterns. Rainfall varies from less than 2,000 mm in the northern savanna area to more than 5,000 mm in some coastal areas. Thunderstorms and torrential rains are common at the beginning and the end of the rainy season. The December-April dry season is characterized by clear skies and lower humidity.

Annual average temperatures range from 24° to 28°C. This range is smallest along the coast. The daily temperature range along the coast varies from 5° to 7°C. In the interior the variation is greater, especially during the harmattan season when hot dry winds blow from the Sahara and daily temperatures vary by as much as 15°C.

Evapotranspiration is in the range of 1,300 to 1,400 mm per year. There is some seasonal variation, with the highest rates coming during the dry season. Although the average rainfall far exceeds evapotranspiration, the combination of relatively high rates of evapotranspiration and negligible rainfall leads to severe soil moisture depletion during the dry season, particularly in the north. The period of soil moisture deficit lasts from mid-January to late April in the north and from early February to March or April in the south. During these periods, the cultivation of arable crops is not possible without irrigation and tree crops regularly undergo severe moisture stress.

2.2.2 Soils

A number of soil types with different physical and chemical properties are found in Sierra Leone. In general, soil productivity for agriculture is low (LRSP, 1979). Most upland soils have a high gravel content; soils throughout the country are generally low in organic material.

Most of the soils in Sierra Leone are very acid (pH 5.5). About 80 percent are well-drained, while five percent, mainly in estuarine and valley swamps, are continuously waterlogged. The heavy wet season rains cause serious leaching of nutrients.

The soils of the tidal swamps and nearby river estuaries are fine-textured and contain an excess of sulphur. Drainage and cultivation of these soils require special management techniques to prevent acidification.

The alluvial soils found along the flood plains of larger streams are among the most productive. They are generally fine-textured and have favorable physical properties but are lacking in nutrients.

In the interior plains and the plateau regions, soil types vary with topography. Inland swamps, which comprise 6,900 km² or 9.5 percent of the total land area of Sierra Leone, are composed of hydromorphic soils and are well-suited for rice production. Most upland soils in the interior plains and the plateaus are well drained. The soils of the hills and mountains region are shallow and rocky with limited potential for agricultural use.

Potash and phosphate are unlikely to be deficient during the first year's cultivation following bush clearance because of the high concentration of these nutrients in the ash residue after burning, but more permanent forms of cultivation would require the addition of both P and K. Nitrogen deficiencies occur, particularly in rice, even during the first year and regular applications of inorganic or organic fertilizers are necessary for adequate yields even under existing forms of cultivation.

The combination of steep slopes, brush fires and heavy rains causes serious soil erosion in Sierra Leone. Crop cultivation has been extended to slopes too steep for annual crop production using existing cultivation practices. Brush fires remove protective cover, which intercepts some of the rain and stabilizes the soil surface, leaving the soil unprotected when the rains arrive. Quantitative studies of this problem are currently being undertaken by the Land Resources Survey Project.

2.2.3 Vegetation

The original vegetation of Sierra Leone was probably moist high forest except in the extreme north, where drier and less humid conditions would have given rise to deciduous woodland. However, this pattern has been greatly modified by the activities of man, so that a mosaic of forest regrowth, secondary forest, and derived savanna resulting from bush fallow cultivation now covers much of the upland area (Map 2-3). Primary high forests are now found only as remnants over about five percent of the country, mainly on hill slopes in the more inaccessible regions. Most of these areas are protected as national reserves although cultivation continues to encroach in places.

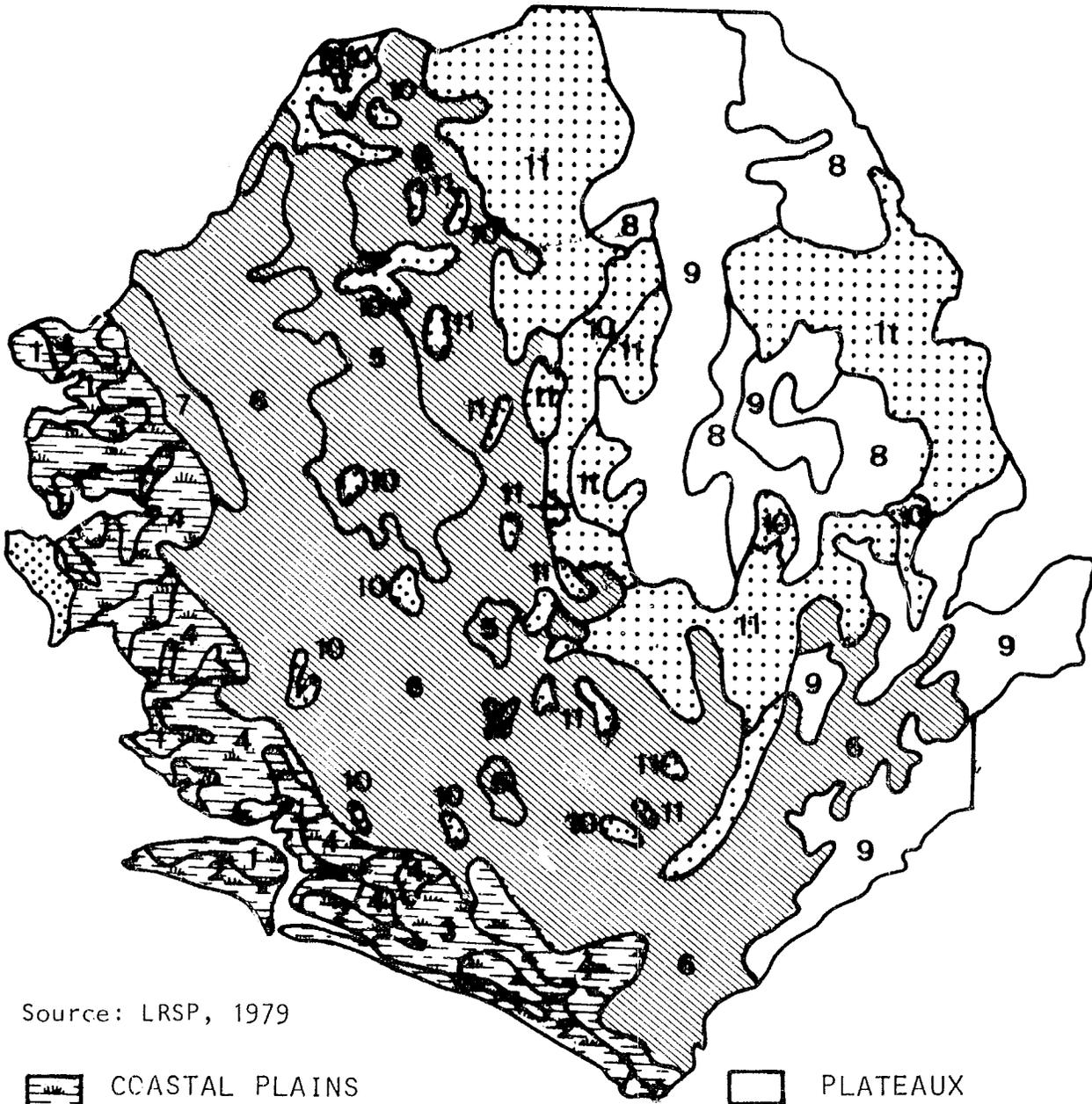
Just over half of the country has a typical association of vegetation types resulting from bush fallowing, which can conveniently be termed forest regrowth. This association includes annual crops, grassland, thicket and regrowth forest, usually with localized remnants of closed forest.

In the drier northern 25 percent of the country, forest regrowth gradually gives way to savanna. In places, this comprises a fairly closed canopy of gnarled trees with tall grasses while elsewhere the trees are scattered and grass predominates.

About two percent of the country, primarily around the main towns and villages, is continuously cultivated for rainfed arable crops. In the south, perennial tree crops are common. Other areas of permanent cultivation include some 8,000 ha of oil palm plantation and 2,100 ha of rubber scattered across the southern half of the country.

2.2.4 Fauna

A relatively high population density and bush fallow cultivation have led to a scarcity of larger mammals in Sierra Leone. Despite indiscriminate hunting, small mammals are relatively common and monkeys together with bush pig, ground hog and porcupine cause serious crop damage. Birds, particularly the weaver, also cause considerable damage to food crops, especially rice.



Source: LRSP, 1979



COASTAL PLAINS

- 1 estuarine swamps
- 2 beach ridges
- 3 alluvial plains
- 4 coastal terraces



INTERIOR PLAINS

- 5 boliland
- 6 undulating plains
- 7 low plateaux



PLATEAUX

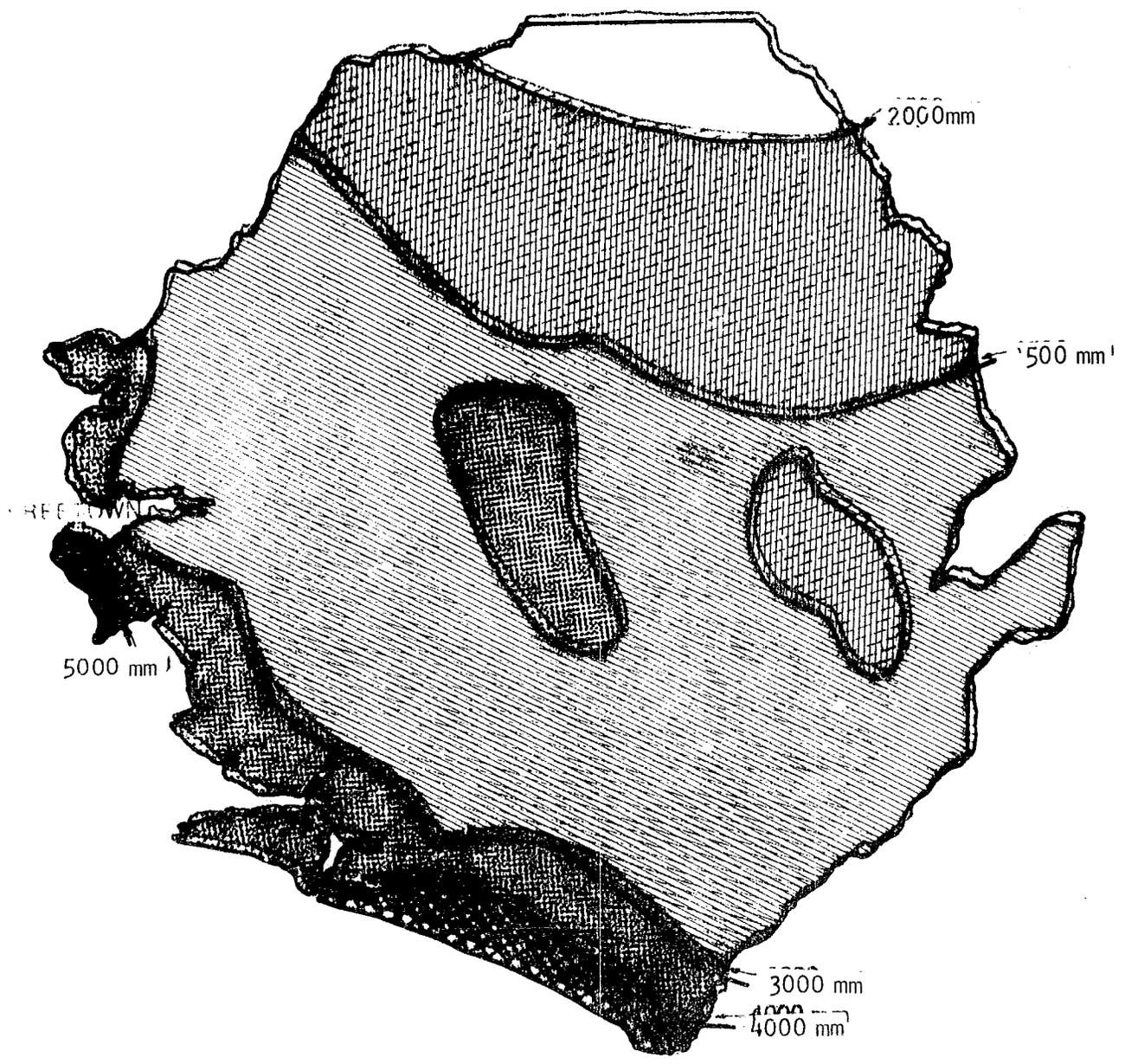
- 8 undulating high-lying plains
- 9 rolling plains and hills



HILLS & MOUNTAINS

- 10 on basic and ultra basic rocks
- 11 on acid rocks

Map 2-1. Main physical regions, Sierra Leone



Source: LRSP, 1979.

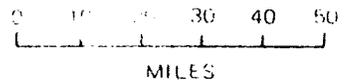
Map 2-2. Distribution of mean annual rainfall, Sierra Leone.

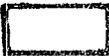
GUINEA



ATLANTIC OCEAN

LIBERIA



- | | |
|--|--|
|  Mangrove Swamp |  Savanna Woodland |
|  Rain Forest (Principal Reserves) |  Lophira Tree Savanna |
|  Forest-Savanna Mosaic |  Coastal Savanna Parkland |
|  Grasslands (Riverain and Upland) |  Secondary Forest, Farm Bush and Farmland |

Source: U.S. Government, Area Handbook, 1975.

Map 2-3. Present day vegetation, Sierra Leone

CHAPTER 3

SOCIAL ENVIRONMENT FOR AGRICULTURE

3. POPULATION3.1.1 Ethno Linguistic Groups

Sierra Leone's estimated current (1980) population of 2.4 million is divided among 17 cultural or linguistic tribes, plus the Krios of Freetown. Although these groups are not totally homogenous internally, fairly well-defined cultural and linguistic traits set them apart and tribal identity and allegiance are still quite strong. Two major tribes, the Temne and Mende, of roughly equal numerical strength, together comprise nearly 60 percent of the total population, with the remaining 40 percent divided equally among the other groups.

With a few exceptions the various tribes are also associated with particular geographic or environmental regions, e.g. the Sherbro along the coast, the Mende in the southern interior plains, the Temne in the northern plains, the Fullah in the drier, more open northeast near the Guinea border. This environmental diversity is mirrored in differing agricultural practices. The Sherbro, for example, are primarily mangrove swamp cultivators, the Fullah are mostly semi-sedentary herdsman, and the Mende and Temne practice primarily upland bush fallow cultivation.

Cultural as well as environmental factors affect agricultural practices, for example, through differing emphasis on communal or individual activities. However, while this diversity should be kept in mind in considerations of Sierra Leonean agriculture, there are also certain common social institutions and conditions that transcend environmental and tribal distinctions and make possible certain valid and worthwhile generalizations. It is these that are emphasized below.

3.1.2 Kinship and Marriage

The primacy of kinship principles in the allocation of land and labor should not be underestimated. Land rights depend on kin-group membership; labor recruitment centers upon kin ties; farming disputes are usually settled by councils of kinsmen. Marriage ties can be viewed at least in part as a way of accumulating agricultural labor in the form of wives and children.

Agnatic descent (reckoning of kin ties through male biological relations) dominates social and economic organization in most rural areas. Villages are generally composed of large extended families consisting of agnatic kin and their wives (plus former slaves captured in military raids in the case of the Mende, Susu and Yalunka). These kin groups, or maximal lineages, are headed by the eldest male.

In the pre-colonial period, maximal lineages constituted the basic farm production and food consumption units. In the colonial and post-independence period, and with the rise of urbanization, secular education

and a generalized cash exchange economy, decisions about production and consumption shifted from maximal lineages to smaller units composed of fathers and their married sons; married brothers; or, frequently today, a single married man, his wives and his children.

Although this fragmentation is occurring throughout Sierra Leone, maximal lineages are still very important in agriculture and in other village activities. Land is generally held by the maximal lineage for the use of its members, and close agnatic kin may exchange labor services. Residential patterns are determined by kin principles so that members of the maximal lineage occupy the same village neighborhood. Household heads within the lineage meet in councils to settle disputes.

The main exception to the rule of agnatic descent in Sierra Leone occurs among the coastal Bullom, or Sherbro and Krim tribes, where uterine descent (through female biological relations) predominates. Residence is often uxori-local -- the husband goes to live in his wife's village, and property is passed on from a man to his sister's sons instead of his own sons.

The percentage of female-headed households, i.e. those in which the woman has responsibility for day-to-day agricultural management, is higher among the Sherbro than among other ethnic groups, although this is changing with increasing male migration in all rural areas. In one Sherbro area studied (McCormack, 1978), 18 percent of the compounds in fishing villages and 23 percent of the compounds in farming villages were headed by women.

In surveys of other regions, female-headed households represented between 17-20 percent of all households. This figure may be low, however, because (1) mostly men were interviewed, and (2) by tradition, the husband's brother or father becomes responsible for his wife and children in his absence, so although the wife might be de-facto head of household, making all substantive decisions, she is not de-jure head.

Although agnatically-oriented kinship dominates in most of Sierra Leone, kin ties through the mother are still important and have some practical value. A young man often turns to his mother's brother if he is in conflict with his own brothers and father, or if his agnates do not have sufficient land for him to farm; a woman frequently marries someone from her mother's family or village.

Marriage in rural Sierra Leone, as in all of Africa, is conceived as a linkage or alliance between two lineages, not just as a bond between a man and a woman. For this reason, the husband and his extended family are expected to make periodic payments in cash, kind, and labor to the wife's extended family in order both to cement the marriage alliance symbolically and to compensate the wife's kin for the loss of her labor and reproductive abilities.

3.1.3 Religion and Ritual

According to the 1963 Census, about 40 percent of the population of Sierra Leone was Muslim, 10 percent Christian and the rest practitioners of indigenous non-universalist religions. Given the large numbers of

rural inhabitants who are nominally Muslim or Christian but who actually know little religious dogma and observe few of the Muslim and Christian ceremonies, however, the census figures must not be taken too literally.

The pantheon of supernatural beings in Sierra Leone's indigenous religions generally includes: a creator or master spirit; the collectivity of ancestral kin who take an active interest in the affairs of the living; forest and water spirits who may be either beneficial or pernicious; and witches and sorcerers who are frequently viewed as an evil double or night-incarnation of living members of the village. Initiation groups are prevalent religious institutions in Sierra Leone. These groups initiate young men and women into adulthood through physical ordeals, and through lectures on practical skills such as hunting and cooking, on village history, and on adult social behavior. Some of the initiation groups continue to regulate the social and political affairs of the adult community through private meetings and public dance ceremonies and through higher stages of ordeal and initiation for mature men and women.

Secret societies are powerful initiation groups which conduct their activities clandestinely and have many functions other than the initiation of young boys and girls.

Five points regarding indigenous religious beliefs are relevant to agriculture in Sierra Leone:

1. Initiation ceremonies are often very long, with the initiates secluded for weeks or even months. The ceremonies take place during the dry season, January to March, when rice double-cropping imposes heavy labor demands.
2. Leaders of secret societies constitute a highly respected group among villagers. Women leaders serve as traditional birth attendants and are influential as shapers and judges of village behavior. They form a powerful group to be consulted and included in any innovative scheme.
3. The very close identification between the ancestors of the lineage and the lineage land makes permanent allocation of land to outsiders highly problematic.
4. Certain portions of village land, reserved for initiations or inhabited by forest and water spirits, are considered unsuitable for conversion into farmland.
5. Accusations of witchcraft and sorcery are often used to express envy toward an innovative village farmer ("He became rich because he destroyed his rivals through witchcraft") or to explain the misfortune of a backward cultivator ("My rice crop was poor because my uncle used sorcery on me"). In other words, witchcraft practices and beliefs alone neither prevent nor promote agricultural change, but they may provide an index of social conflict caused by such change.

3.1.4 Local Politics

Throughout Sierra Leone, local politics is dominated by certain elite lineages which also dominate the nominal and effective control of land.

Sierra Leone's three provinces and 12 districts are sub-divided into about 150 chiefdoms which form the highest level of local government. The office of paramount chief is held by a member of one of the elite lineages of the area, a status which the lineage bears either by virtue of conquest or earliest settlement of the lands. Yalunka, Fullah, and Susu chiefships generally derive from conquest while many elite Temne and Mende families are founded upon first settlement by an errant hunter or wandering exile.

The paramount chief's right to levy fines and adjudicate many local court cases make this a powerful and lucrative office. An immense patronage system is built around the position in each locality. For this reason chiefship elections, in which rival candidates from the elite families can stand for office, are often fiercely, even violently, contested.

Claims to the lower offices of section chief and village headman are also based on elite status as either a conqueror or aborigine, depending on the region. Membership in such an elite lineage is furthermore linked to that lineage's dominant landholding position in the community.

Colonial rule and the establishment of the present system of tribal authority had an uneven political impact on different parts of Sierra Leone. In some northern regions, the power of Fullah warlords was reduced by the new system, especially after their captives were liberated by the British. In some regions of the south, however, where large-scale centralized political units had never existed, the paramount chiefship greatly enhanced the power of local political figures.

Within the village, the position of headman actually confers less authority than the formal hierarchy would seem to indicate. In most parts of Sierra Leone, all male household heads belonging to landholding lineages have a voice in the political affairs of the community. Non-land holders, whether ex-slaves or "strangers" (outsiders), have a minor say or none at all.

Among householders with a legitimate stake in village politics, age and ability, rather than inherited title, lead to positions of influence. In this way, elders and men of exceptional personal qualities may become influential figures or first among equals.

The implications of local political culture for agriculture are:

1. The paramount chief, as adjudicator of land disputes, plays an important role in determining land ownership, although he might also be manipulated by the contestants. Any land reform measures connected with agricultural projects would require at least his formal approval.

- 2. Paramount chiefs, section chiefs and village headmen tend to belong to important land controlling families, but their positions do not automatically entitle them to aggrandize their land-holdings.
- 3. The positive or negative attitudes of chiefdom officials and other influential community members can either facilitate or doom innovative agricultural projects.

3.1.5 Land Tenure

Although the tenure arrangements governing farmland are varied and seemingly complex, a simple distinction between land-holding and land-use is the key to understanding the tenure situation in Sierra Leone.

Land-holding rights are vested in the maximal lineages. The lineage, including ancestors, living kin and future, as yet unborn, relatives, hold a section of village territory as a corporate group. The elder represents the lineage in making and enforcing decisions concerning the allocation of lineage land, subject to the approval of all household heads. Membership in the lineage is the only necessary precondition for a household head to obtain a portion of land for farming; all lineage members are automatically entitled to farmland upon request. Since the lineage as a corporate group holds the land in perpetuity, definitive alienation of part of that land (i.e. turning over land-holding rights to a non-lineage member) is considered a gross violation of the land tenure system.

In practice, the elder automatically approves applications from members to cultivate uplands as long as fallow cycles are being observed.

A distinction is usually drawn between two types of land-holding groups: elite lineages which by virtue of conquest or early settlement control large areas of village land, and secondary lineages, often later arrivals, which control smaller shares of village territory.

An elder may also grant land-use rights, or rights of usufruct, to members of other lineages in the village or to outsiders. The precise terms of obligation of the land-user toward the land-holder vary considerably, but under no conditions is the land-user entitled to assume land-holding rights or to assign use-rights to someone else. In other words, regardless of the length of tenure of a land-user, in principle the land always ultimately reverts back to the land-holding lineage.

In the case of uplands, which are only cultivated for one or two years with such annual crops as rice, maize, cassava, and groundnuts before returning to fallow, use-rights are renegotiated yearly. This is also the case with unimproved swamps. In some instances, a land-user may only be seeking a short-term usufruct; in other situations, he may request a portion of upland from the lineage elders each year during his lifetime.

Fixed agricultural investments (improved swamps, tree crops) belong to the land-user who made them. Normally, the lineage will grant the tenant and his heirs continued use of the land supporting the investments. If, however, the lineage wants to revoke land-use rights, problems

of compensation to the tenant may occur.

In Sierra Leone, four different land-use arrangements are distinguished:

1. Traditional "begging" requires a token payment in kind to the lineage elder in return for use-rights. As the term implies, the land-user is considered to have an inferior status to the land-holder, and owes him respect and deference.
2. Tenancy demands a fixed rental in cash, kind (usually rice), or labor. This is a recently developed "economic" form of begging.
3. Leasing, a rather rare and recent institution, gives the land-user rights to a portion of land for a stipulated period of time at a fixed annual rate of payment.
4. Pledging, a practice which is older than either tenancy or leasing, involves forfeiting use-rights in exchange for a sum of money (or possibly a quantity of rice) borrowed. The holder of the pledge is entitled to use the land until the debt is repaid, the net output from that land becoming a sort of interest charge on the loan.

Outright land purchase, that is, the exchange of land as a commodity, is a violation of civil and customary law and is exceedingly rare in Sierra Leone, especially outside of the major towns and the Western Area, where English freehold land law has been in force for nearly 200 years.

In summary, the salient points relating land tenure to agricultural development in Sierra Leone are:

1. Security of access to farmland is offered to all members of land-holding lineages. It is unclear whether increasing subdivision through multiple inheritance is a problem.
2. In principle, security of use is guaranteed to all land-users when they invest in improved swamps and tree crops. Whether this security of use is respected in practice is debatable.
3. There is no market for land-holding rights (i.e. land as a traded commodity), but there does seem to be a considerable market for land-use rights through begging, rental, lease and pledge. Whether the market is large and flexible enough to promote agricultural development is a moot point.

3.1.6 Labor Practices

As only one village level assessment of labor-time allocated to farming has been conducted in Sierra Leone in recent years (Spencer, 1976) data on labor-intensity is sparse.

The Spencer study, conducted in a village in the Eastern Province, calculated average annual labor-time in agriculture as follows:

1. Traditional cultivation: 1,020 hours for men and 1,008 hours for women.
2. First year of improved swamp farming: 1,968 hours for men and 1,044 hours for women.
3. Second year of improved swamp farming: 1,420 hours for men and 1,104 hours for women.

These figures are higher than the 800 to 1,000 hours a year tallied for farms in various parts of sub-Saharan Africa (Cleave, 1974). Spencer's yearly labor supply figures average out to only 84 hours a month, but the demand for labor is not constant throughout the year. Instead, there are wide fluctuations by season, with certain peak and slack months. Male labor input rises to 147 hours in June, when plowing of rice fields takes place, and falls to 51 hours in April. Female labor time peaks at 164 hours in August, when weeding is the dominant activity, and plummets to 18 hours in March.

There is a fairly well-defined division of labor by sex in Sierra Leone, although this is somewhat flexible and marked by ethnic and regional variations. The most difficult and dangerous tasks, such as felling trees and burning and clearing, are usually performed by men while women weed, thresh, and process the crops. Both men and women plant, harvest, and headload the crops into the village.

Family labor is provided by the household head and his economic dependents: wives, children and unmarried siblings. In some cases, aged parents, married brothers and their offspring, and married sons and their children may also belong to an extended household. But with the fragmentation of the extended family as an economic unit and with more children attending school and more young men seeking employment in the towns and mining areas, household heads are finding the family labor base greatly reduced.

The non-reciprocal labor services of other close kin can also be tapped. A man frequently asks his sister's sons to help brush his fields or harvest his coffee. Conversely, a young independent farmer will respond promptly to his father's or maternal uncle's request for help in transplanting rice.

During periods of high labor demand -- brushing on uplands, transplanting and plowing in swamps, and harvesting on coffee farms -- family labor is supplemented by various forms of labor exchange, client services, and wage work. Various forms of non-wage labor that an individual farmer may try to exploit include:

1. Labor exchange groups, generally formed by young independent farmers with few wives or close junior kin to enlist for agricultural labor. These groups of 10 to 20 men cooperate on a particular task, such as brushing on each man's farm in rotation.

2. Communal labor, sometimes viewed as labor donated to the chief by members of the community, which takes two sub-forms: In the first, which occurs among the Mende in particular, certain lands are cultivated communally and the harvest set aside in a storehouse controlled by the headman. This food stock is redistributed to the various households in case of famine and drawn upon for entertaining special visitors to the village. In the second form, which is found in many parts of Sierra Leone, paramount chiefs demand the labor services of the villages in their constituencies, either for public projects or for private farms.
3. Residual slave-labor services, still performed by ex-slaves for their former masters in parts of the Northern Province.
4. Client labor provided to land-holding lineages by land-users as compensation and a sign of respect for the privilege of occupying their patrons' territory.

Wage labor accounts for a minor fraction of all agricultural labor in Sierra Leone. Perhaps the most common type of wage labor is work companies, or kompins as they are called in Krio. The kompins are an adaptation of labor exchange groups in which the group hires itself out for a daily fee, plus transportation and a mid-day meal.

Other types of wage labor include daily and monthly wages and piece work rates (for brushing a given acreage, for example). Share-crop labor of the kind commonly enlisted in cocoa and coffee growing regions of the Ivory Coast and Ghana is unknown in Sierra Leone.

Landless labor, including migrant wage labor, is exceedingly rare. According to a Sierra Leonean specialist on labor migration, the only sections of the country that receive itinerant farm labor are the mechanized Northern Bolilands, the Torma Bum rice zone, and the cocoa and coffee producing areas in the east (Tommy, 1980b).

3.1.7 Off-Farm Employment

Even though most productive labor-time in rural Sierra Leone is devoted to farming, a significant amount of labor is allocated to non-farm activities such as trading, house repair and crafts. The only recent survey of non-farm work was conducted by Spencer and Byerlee in 1976. They found that 19 percent of all rural households are engaged primarily in non-farm employment, and that an additional 11 percent listed non-farm activities as a secondary pursuit. Furthermore, Spencer and Byerlee report that 11 percent of all work-time in the rural areas is devoted to non-farm activities. Forty percent of those males involved primarily in non-farm employment are engaged in manufacturing and repair, 30 percent in trading, and 15 percent in government service.

Spencer and Byerlee seem to have neglected female non-farm activities, such as market trading, spinning cotton thread, and manufacturing baskets and pottery. If these jobs were included, the percentage of

labor time devoted to the non-farm sector could be expected to rise considerably. Finnigan (1965), in her survey of the Limba people, gave the following catalogue of non-farm activities: smithing; leather work; cloth weaving and dying; house building and repair; manufacture of mats, soap, bead-work, combs, stools, strings baskets, traps, and various musical instruments.

The point to retain regarding non-farm activities and agricultural projects in Sierra Leone is that a large portion of the rural population currently pursues viable and remunerative non-farm work both during the peak time of the year and during the off season. Plans for double cropping and labor intensification of agricultural production will have to reckon with the high value rural folk place on some of their non-farm jobs.

3.1.8 Consumption Patterns

As far as rural consumption patterns are concerned, we have only the national sample survey of 204 households carried out by Byerlee and King (1977). They calculated average national per capita consumption expenditures, including both subsistence and cash components, of Le 116 (\$128 in 1976), or Le 800 for an average family of 6.9 persons. Of this total, 48 percent was allocated to subsistence consumption, while 52 percent went to cash purchases. These figures belie any impression of the typical Sierra Leonean farmer as a self-contained, auto-subsistence cultivator. The fact is that the majority of his consumption is covered by cash expenses. Conversely a considerable portion of his output (food, goods, and services sold on the market and labor for wages) must be converted to money for cash expenditures.

The allocation of total consumption expenditure among different items is given in Table 3-1. This shows that 70 percent of all consumption is for food, 3.6 percent for beverages and tobacco, 2.3 percent for small-scale industrial goods, and 13.4 percent for large-scale manufactures.

Perhaps most significant for an understanding of rural production/consumption behavior is the fact that 21 percent of all consumption or 40 percent of all cash purchases were accounted for by locally produced food (Table 3-2). Moreover, 30 percent of all food consumed by an average rural Sierra Leonean is purchased. Conversely, nearly one-third of all food must be commercialized. This significant amount of food exchanged commercially can be accounted for by a number of factors: large amounts of rice mortgaged to money-lender/traders; large food purchases during the "hungry season" prior to the harvest; major differences in inter-household production resulting in surplus and deficits relative to household food needs; and regional specialization in certain traded crops (e.g. vegetables in the northeast).

Table 3-1. Average budget shares by commodity, Sierra Leone

Commodity group	Percentage of total expenditure at the mean income level
Rice	39.4
Cereals and root crops	8.2
Fruit and vegetables	2.9
Palm Oil	7.5
Imported salt and condiments	1.4
Meat and livestock products	1.6
Fish	8.4
Processed and other food	<u>0.6</u>
Total food	70.0
Rural beverages and tobacco	1.9
Urban and imported beverages and tobacco	<u>1.7</u>
Total beverages and tobacco	3.6
Bread	0.1
Metal work (SSI) ^a	0.2
Wood work	0.3
Gara cloth	0.8
Tailoring	0.4
Other household and personal goods (SSI) ^a	<u>0.5</u>
Total small-scale industry products	2.3
Fuel and light	3.1
Metal work (LSI) ^b	1.4
Clothing	1.9
Imported cloth	3.0
Shoes	0.9
Other household and personal goods (LSI) ^b	<u>3.1</u>
Total large-scale industry products	13.4
Transport	2.2
Services and ceremonial	4.3
Education	1.4
Osusu saving ^c	1.0
Miscellaneous	<u>1.8</u>
Total	100.0

^aSSI indicates small-scale industry.

^bLSI indicates large-scale industry.

^cOsusu are traditional savings associations.

Source: King and Byerlee, 1977, p. 20.

Table 3-2. Average budget shares for commodities grouped by origin, Sierra Leone

Origin classification	Percentage of total expenditure at the mean income level
Rural Subsistence food products ^a	47.9
Rural purchased food products ^a	<u>21.1</u>
Total rural food products	69.0
Rural nonfarm goods	1.2
Rural services and ceremonial ^b	<u>7.6</u>
Total rural products	77.8
Small urban products ^c	3.8
Large urban products	5.1
Imported products	<u>13.3</u>
Total	100.0

^aIncludes beverages and tobacco produced in rural areas.

^bIncludes education and Osusu savings as well as rural services and ceremonial.

^cIncludes transport, most of which is operated by small entrepreneurs.

Source: King and Byerlee, 1977, p. 22.

3.2 NUTRITION AND HEALTH¹

3.2.1 Introduction

Malnutrition is a primary cause of poor health in Sierra Leone and a major reason why in some rural areas as many as half the children die before age five. Undernutrition (lack of sufficient calories and/or specific nutrients) adversely affects mental and physical development, productivity, and the length and quality of an individual's life. Malnutrition is not only a consequence of underdevelopment but a factor contributing to it. The most serious malnutrition is found among urban poor and subsistence farmers. Within these groups, young children and pregnant and nursing women are most vulnerable.

In Sierra Leone, the principal nutritional disorder is protein-calorie malnutrition. Nutritional anemias are also widespread. The synergistic relationship between nutrition, parasites and infectious diseases results in a high incidence of mortality and morbidity. Women of childbearing age are in an almost constant state of nutritional stress from repeated pregnancies, prolonged lactation and hard physical labor. The causes of malnutrition are numerous and complex, but reflect the quality of food consumed and body's ability to utilize it. These direct causes, however, are, in turn, a function of a broad range of economic, social and environmental factors.

3.2.2 Socio-Economic Factors

Certain factors associated with chronic undernutrition were revealed by the 1978 National Nutrition Survey. The prevalence of undernutrition in the Sierra Leone sample was found to be significantly greater when:

1. A household's source of water was a river rather than a tap or well.
2. The household head was a farmer.
3. Someone other than the mother was primarily responsible for the child's care and feeding.
4. The mother spent comparatively less money at the market.
5. A child was not born in a hospital or clinic.

Although these associations must not be regarded as causal, they may be used as guidelines in determining some of the factors leading to undernutrition. Taken together these and other associations indicate that poverty, lack of knowledge and disease interact with diet and other factors in a child's environment to determine his nutritional status.

¹ Unless otherwise cited, all data are taken from the Government of Sierra Leone, National Nutrition Survey, October 1978.

3.2.3 Health Service

Many of the associations revealed by the 1978 National Nutrition Survey indicate the roles that health services and poor environment have in influencing nutritional status.

The official infant mortality rate is 182/1000; in some areas of the country up to 50 percent of the children die before the age of five. Life expectancy is 46 years. The major health problems include intestinal parasites, diarrheal diseases, respiratory tract infections, measles, neonatal tetanus and malnutrition among children and anemia and endemic diseases such as malaria, onchocerciasis and schistosomiasis among all age groups.

The majority of the population, particularly in the rural areas, does not have easy access to government or private health services. For example, in 1975 the Ministry of Health reported that 14,671 deliveries occurred in government hospitals and maternities. Since there were 133,000 births in Sierra Leone that year, only 11 percent took place in government facilities. Most of the other births were assisted by traditional birth attendants.

Recent data show the population per physician ratio at 18,442, the population per nurse ratio at 2,964, and the population per hospital bed ratio at 807. Hospitals, clinics and medical professionals are not evenly distributed throughout the country. For example, 60 percent of nurses in government services are in the Western Area.

In response to the critical health needs of the population, the government and other groups have recently begun emphasizing primary health care activities and improved training for traditional health workers, especially midwives.

With the realization that most health problems are avoidable through basic health education and simple preventive measures such as vaccines and oral rehydration, emphasis is changing to health maintenance rather than cure. There are several primary health care programs getting underway in the country. A creative health education program has been developed by CARE utilizing culturally appropriate education materials and a National Expanded Program of Immunization has been planned and is in the initial stages of implementation.

3.2.4 Water Supply

Eight-eight percent of the total population in Sierra Leone does not have access to safe water (25 percent in urban areas). Water-borne diseases contribute to the high rates of morbidity and mortality, particularly among children. Rural women and children must walk long distances (over half a kilometer is not uncommon in the dry season) to fetch water each day.

3.2.5 Nutritional Assessment

Throughout Sierra Leone, 24.2 percent of the children are chronically undernourished. The prevalence rate for chronic undernutrition

is 10.3 percent in Freetown compared with 26.6 percent in rural areas. The rates are similar in each province, ranging from 23.7 to 25.8 percent. The prevalence is lowest in infants, increases after 12 months of age, and reaches a plateau from 21 to 59 months².

Anemia³ is present in 58.1 percent of children aged 6-59 months. The prevalence rates are higher in children aged 34-59 months (65.8 percent) than in those aged 6-23 months (48.4 percent). Anemia is lowest in Freetown (25.7 percent); there is little difference among the provinces. Thirty-one percent of pregnant women studied in the 1978 survey were diagnosed as anemic.

Malaria is often an important cause of anemia - almost one-third of children aged 3-59 months have malaria parasites in their blood. The country-wide incidence of roundworm infestation, which may also cause a significant nutritional drain in a child, is 18.8 percent.

3.2.6 Maternal Nutrition

Maternal nutrition status is more difficult to define using anthropometric measures. In Sierra Leone, 6.1 percent of the mothers have evidence of arm wasting. Approximately twice the prevalence rate of undernutrition (arm wasting) is found in pregnant mothers. Fat wasting is more prevalent in rural areas (28.0 percent) than urban areas (20.0 percent). Maternal malnutrition correlated with low birth weights which are associated with the failure of children to thrive.

3.2.9 Family Food Consumption

Cereals, consumed by 99 percent of Sierra Leonean families, are the major staples throughout the country. Rice is the most widely eaten cereal, followed by wheat breads, maize, millet and sorghum.

Foods in the tuber group (cassava, yam, sweet potato, cocoyam) are most commonly consumed by families in the Southern Province (35 percent) and Freetown (34 percent). In the east, 29 percent of the families eat at least one food from this group while in the north the rate drops to 15 percent.

The consumption of foods with a high vegetable protein content varies throughout the country. They are most commonly eaten by families in Freetown (86 percent), followed by those in other urban areas (83 percent). The most widely eaten vegetable protein foods include groundnuts, beans, benniseed, peas and melon seeds.

² *These findings indicate that there was no famine or near famine situation in any areas described at the time of the survey. Conditions at the time of the 1978 survey were relatively favorable, and adverse seasonal influences on nutrition were probably not reflected.*

³ *As defined by the World Health Organization based on a low hemoglobin value - less than 10 gm percent for children 6-23 months and less than 11 gm percent for those 24-59 months.*

Throughout the country, almost every family has some animal protein in their diet. This is based on a wide consumption of salt and freshwater fish, usually dried or smoked. Small amounts of beef, goat, "bush meat", eggs, poultry and milk are included in the diet.

Available data from CARE investigations in 1977 indicate that in addition to dark green leafy vegetables (DGLVs), many Sierra Leoneans include small quantities of garden vegetables in their diet. The most popular include pepper, onions, okra, eggplant, pumpkin, tomato, jacato, and squash.

Oils (usually palm oil) are widely consumed throughout the country. Approximately 95 percent of the families in Freetown and the Southern Province have at least one of the oil group in their daily diet; 87 percent of those in the Eastern Province and 78 percent of those in the Northern Province consume oil.

In Freetown, 68 percent of the families included refined sugar in their daily diet. This figure drops sharply to 32 percent in other urban areas and 8 percent in the rural areas.

The most recent Food Balance Sheet, prepared by FAO for 1975-1977, indicates a per capita availability of 2102 calories and 47.7 grams of protein per day (Table 6-13). Both of these fall short in the aggregate sense of supplying a recommended minimum. Rice supplies more than half of the calories and almost half of the protein. Fish is the primary complete protein supplement, supplying 17 percent of the total protein and over 70 percent of the animal protein.

3.2.8 Meal Patterns

Generally, one main meal is eaten in the late afternoon, consisting of large portions of rice served with one of several different sauces. The sauce is usually made of leaves (potato, cassava or other greens), palm oil, hot peppers, onions, and often some protein food such as smoked or fresh fish, groundnuts, peas or beans, chicken or "bush meat". When rice is not available, cassava in the form of foo-foo is substituted and also eaten with a nutritious sauce. One meal per day appears to be the average pattern of slightly over half of the population.

3.2.9 Infant Feeding and Weaning Practices

Breast feeding is nearly universal. However, in urban areas and in Freetown, the rates drop to 82 and 79 percent respectively. A 1977 survey in villages in two rural provinces found that 100 percent of the babies were breast fed from birth. Prolonged breast feeding (24-30 months) is more common in the rural areas and least common in Freetown (3.5 percent).

As expected, more children in Freetown and other urban areas receive more non-breast milk than rural children. There is considerable overlap between the percentage of children fully breast fed⁴ and those

⁴ Full breast feeding is defined as breast feeding a child five or more times a day.

that receive non-breast milk, so that one type of feeding does not necessarily preclude the other.

The first solid food to be introduced is usually a pap made from rice, cassava or corn flour, often with oil added. Dietary studies have shown that among children aged 6-11 months, less than 25 percent received vegetable protein; less than 30 percent received animal protein; 21 percent received DGLVs and only 15 percent received fruit. The DGLVs include spinach, crain-crain and cassava, and potato, bitter, and sorrel leaves. The most widely consumed fruits include bananas, mangoes, oranges, papayas, limes, and pineapple.

At 12-17 months, 51 percent of the children received vegetable protein, 69 percent animal protein, 36 percent DGLVs, and 24 percent fruit. The variety of food groups consumed in the child's daily diet is greatest in Freetown, followed by the Eastern Province. According to two dietary studies carried out in 1977 and 1978 by CARE, the foods most commonly given to children 4-24 months old include: breast milk (84 percent), red palm oil (51 percent), rice pap (84 percent), fish (40 percent), onions (25 percent), peppers and groundnuts (22 percent each), powdered milk (17 percent) and potato leaves (16 percent).

While survey data indicate that children over 17 months old usually receive the same types of foods as their families, children in the critical 6-17 months do not. For example, throughout the country almost every family has some animal protein in their diet, based on a wide consumption of fish. Very few children aged 3-5 months receive any animal protein foods, and only 30 percent of children aged 6-11 months. In the 12-17 month group, approximately 67 percent of the children throughout the country receive animal protein; the figure is over 90 percent for the 18-30 month group.

3.3 TRADITIONAL CREDIT

It is estimated that only three percent of domestic credit demand in rural Sierra Leone is met through institutional mechanisms such as cooperative societies and development banks, with the remaining 97 percent channeled through informal means (Moinuddin, 1969). Little is known about the traditional rural credit system, as there has been no study of it. Peace Corps Volunteers speculate 50 to 75 percent of all villagers take seasonal credit; the SLPMB estimates that over half of all commercialized rice in the country is effectively "mortgaged" to money-lenders. It is clear, moreover, that most loans are for consumption during the hungry season while only a small fraction of total rural credit is for investment purposes, payment of fines, emergency medical expenses, funerals, etc.

An undetermined amount of rural credit is obtained from friends and relatives at little or no interest. The balance is extended by traders and money-lenders, often at very high interest rates. The most common arrangement is for a bushel of rice loaned to be repaid with two bushels or for a cash loan to be reimbursed with rice (e.g., Le 10 credit repaid with two bushels of rice valued at Le 16).

This traditional credit system certainly possesses certain positive features which account for its success. Delivery of credit is usually prompt; the future rice crop is taken as sufficient collateral and the rural money-lender frequently knows his clients personally, enabling him to assess well the loan risk and to apply pressure for repayment.

On the other hand, informal rural credit has its drawbacks, too. Money-lenders' capital is generally too small to cover major investment loans, and these traditional creditors are less interested in long-term investment than short-term consumption credit. In addition, the high rate of interest charged often eliminates any effective surplus for farmers which could otherwise be devoted to savings and future productive investment.

CHAPTER 4

AGRICULTURE AND THE MACROECONOMY

4.1 SIZE AND DISTRIBUTION OF AGRICULTURE OUTPUT

Based upon the number of individuals employed, agriculture is by far the largest sector of the economy of Sierra Leone. The 1970 estimate (CSO, 1971) of the percentage of individuals deriving their livelihood from agriculture was 75 percent. Although considerable rural to urban migration is occurring, the percentage likely still exceeds 65 percent.

When a value is imputed to subsistence agricultural output, agriculture, forestry, and fishing constitute the largest sector of the economy in terms of contribution to GDP. For the ten year period 1968/69 to 1977/78, the percentage contribution of agriculture to GDP ranged from 25.4 to 35.8 with a mean contribution of 30.1. The percentage contribution of domestic or nonexport agriculture ranged from 21.7 to 30.6 with a mean contribution of 25.4 percent (Table 4-1).

4.2 FOREIGN TRADE AND BALANCE OF PAYMENTS

Sierra Leone's foreign trade and balance of payments situation is greatly dependent upon the world market price for primary products -- minerals (primarily diamonds) and agricultural products (coffee, cocoa, palm kernel oil). Like most developing nations, Sierra Leone has recently shown recurring deficits in merchandise trade (Table 4-2).

Sierra Leone's 1975-76 balance of payments (BOP) is shown in Table 4-3. Data are not available for more recent years, but those presented are also likely to be indicative of the current BOP situation. Increases in world market prices for diamonds, coffee and cocoa for the period 1977-79 may have improved the BOP for those years, but a chronic deficit remains a major problem. The value of agricultural exports as a percentage of total exports has risen significantly over the past ten years, from the 15-20 percent range to over 40 percent in 1977. This, however, is due in large part to increases in the world market prices for coffee and cocoa rather than to increases in production. This shortrun BOP assistance from high prices for minerals and agricultural exports can not be viewed as a permanent situation. Projections for the world prices for coffee and cocoa in real terms (1978 constant dollars) are projected to remain constant or decline through the 1980's (Table 4-4).

4.3 FISCAL POLICY AND TAXATION IN AGRICULTURE

A low level of domestic savings and the slow growth of the economy in real terms have made agricultural development expenditure heavily dependent on the public sector. And as the GOSL has basically three alternatives for the financing of agricultural development -- tax revenues, government borrowing (commercial and concessional) and foreign assistance grants -- the performance of government revenues influences both the overall magnitude and direction of investment in agriculture.

Table 4.1. Gross domestic product for Sierra Leone by sector of origin 1968/69 to 1977/78
(factor cost in millions of leones at current prices)

	Year									
	68/69	69/70	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Ag. Forestry and Fishing	90.2	89.9	94.6	97.4	107.6	129.9	185.1	213.0	263.9	290.5
Mining	45.4	63.5	55.5	53.2	62.5	78.3	76.8	60.4	67.7	87.4
Industry	16.8	18.4	19.6	19.3	13.5	25.9	30.0	31.2	35.4	43.2
Construction	8.7	11.8	12.2	11.2	10.4	15.9	15.7	17.1	22.1	25.7
Energy	2.4	2.8	2.5	2.6	1.5	-1.0	0.2	4.7	4.7	4.5
Transportation and communications	27.9	34.1	35.6	36.3	38.6	47.9	57.9	65.5	71.1	81.3
Commerce	42.5	48.1	50.5	49.0	52.8	60.3	75.4	68.4	88.6	90.3
Finance	20.1	23.9	25.2	25.2	26.6	33.5	39.4	47.3	51.7	56.4
Public Administration and Services	24.1	26.6	27.4	29.8	33.7	40.2	45.9	47.0	62.4	66.9
GDP at Factor Prices	278.1	319.0	323.1	324.0	352.2	425.8	521.0	558.6	661.7	740.7
GDP at Market Prices	310.9	353.3	354.9	359.9	390.6	481.8	572.7	613.5	737.3	817.2
Total Exports	77.6	99.5	68.8	92.6	98.6	103.9	123.9	99.5	128.1	128.8
Exports as % of GDP (Mkt. prices)	24.96	28.16	19.39	25.73	25.24	21.50	21.63	16.22	17.37	15.76
Ag. as a % of GDP (Mkt. prices)	29.01	25.44	26.65	27.06	27.54	26.96	32.32	34.71	35.79	35.54

Source: Bank of Sierra Leone Economic Review, Vol. 12, No. 1-2, Jan.-Jan. 1978, Table 21.
Bank of Sierra Leone Annual Report and Statement of Accounts for the year ended June 30, 1976,
pp. 99.

Table 4.2. Exports and Imports for Sierra Leone, 1975-78

	1975	1976	1977	1978 ^b
	(thousands of leones)			
<u>Exports (f.o.b.)</u>				
Diamond	63,031	71,986	64,903	118,000
Bauxite	2,266	4,568	7,888	7,000
Coffee	6,604	7,275	50,204	19,000
Cocoa	6,750	7,725	18,963	23,000
Palm Kernel Oil	3,538	3,889	4,602	8,000
Other ^a	<u>22,751</u>	<u>13,869</u>	<u>10,277</u>	<u>19,000</u>
Total Exports	104,940	109,312	156,737	194,000
Agr. as % of total	16	17	47	26
<u>Imports (C.I.P.)</u>				
Food	26,679	30,960	35,770	48,387
Minerals, fuel and Lubricants	20,149	12,419	29,182	34,996
Chemicals	12,218	13,957	15,948	23,202
Manufactured Goods	63,085	67,788	70,288	95,622
Machinery	34,253	33,231	37,998	70,522
Other	<u>11,416</u>	<u>12,903</u>	<u>17,042</u>	<u>18,115</u>
Total Imports	167,800	171,258	206,228	290,844
Balance of merchandise Trade	-62,860	-61,946	-49,941	-96,844

a. Includes re-exports

b. Provisional

Source: Ministry of Development and Economic Planning Annual Investment Programme 1979/80, Freetown 1979, p. 19.

Table 4.3. Sierra Leone balance of payments, 1975 and 1976

	1975	1976
	(million of leones)	
Exports f.o.b.	116.6	120.0
Imports f.o.b.	148.1	156.0
Trade Balance	-31.5	-36.0
Freight, insurance, etc.	- 9.1	-10.0
Investment Income	- 9.8	- 8.0
Other Services	-16.5	- 9.0
Total Goods & Services	-66.9	-63.0
Net Transfer	9.4	9.0
Current A/C surplus or deficit	-57.5	-54.0
Private	16.4	7.7
Official	23.2	27.3
Capital A/C surplus or deficit	39.6	35.0
Error or Omissions	- 2.8	-
Overall Balance	-20.7	-19.0

Source: Ministry of Development and Economic Planning Annual Plan 1977-78, Freetown 1977, p. 43.

Table 4-4. Commodity prices and price projections in 1978 constant dollars for coffee and cocoa

Year	Coffee	Cocoa
	- - - - (cents per pound) - - - -	
1980	105.4	106.3
1981	98.6	96.1
1982	91.5	90.7
1985	102.3	72.8
1990	111.5	54.5

Source: World Bank Report No. 814/78, June 1978.

Sierra Leone's tax collections appear to be lower than what could be theoretically achieved; revenue is primarily generated from indirect (import, export and excise) taxes. Recurrent revenue receipts for the past three years are shown in Table 4.5. Given the figures from Tables 4.1 and 4.5, the 1977/78 tax rate for the economy as a whole works out to 17.3 percent of GDP, of which indirect taxes accounted for 73.9 percent of the total¹. This limited revenue-generating ability severely constrains the GOSL's investment capability, and the dependence on indirect taxes serves as a disincentive to domestic production. This is because the export tax constitutes a tax on production rather than productive resources and results in lower prices to producers; the large role played by import duties in overall government revenue creates a vested interest in their continuation, i.e. continued high import levels rather than import substitution. The net result of the government's revenue bind is a high dependency on foreign assistance and commercial borrowing to meet development requirements.

The other important source of funds in the economy, foreign investment, has been largely offset by the repatriation of profits. During the period 1963 to 72, the outflow of financial resources associated with foreign investment exceeded new investment.

Table 4.6 shows the source of GOSL expenditures, both recurrent and development, and the percentage share of agriculture in the development budget for the years 1973/74 through 1979/80. Although GOSL investment in agriculture has been increasing, foreign funds can be seen to account for well over half of the total development expenditure, and agriculture's share of the development budget fluctuates between 11 and 21 percent, compared to a share of GDP for these years of 27 and 36 percent.

Coupled with low investment has been the high effective rate of surplus extraction (taxation) from the cash crop subsector of the economy. While the listed duties on agricultural exports has not exceeded 40 percent, the effective rate of taxation as measured by $(S-P)/S$, where S is the value of SLPMB sales and P is the value of purchases, has ranged as high as 61.2 percent with a mean of 29.9 percent during the period 1968/69 to 77/78 (Table 4.7)².

Finally, government fiscal policy has tended to exacerbate rather than counterbalance economic cycles. Government access to foreign exchange and a large share of its revenue has come through the export of minerals and primary agricultural products. This has made the availability of foreign exchange subject to the fluctuations of world commodity and minerals markets. Because the major share of productive

¹ The low tax rate and, especially, the low incidence of taxation on personal income (6.4 percent of total in 1977/78) may result in part from the GOSL's political reluctance to raise these taxes. Of equal importance are the existing structural impediments, i.e. the "parallel economy" (to be discussed later). Attempts to tax the personal incomes generated in the diamond trade, for example, would result in increased smuggling and an accompanying drop in legal exports, with the result of lower government revenues.

² The difference between posted and effective tax rates represents SLPMB profits and overhead.

Table 4.5. Recurrent revenue receipts, Sierra Leone 1977-79 and 1979.80

Source	Year Year		
	1977/78	1978/79 ^a	1979/80 ^b
	(thousands of leones)		
Indirect Taxes			
Import duties	47,971	49,947	46,400
Export duties	25,583	18,032	20,043
Excise duties	23,027	25,327	23,424
Miscellaneous	<u>7,929</u>	<u>15,627</u>	<u>15,125</u>
Total	104,510	108,933	104,992
Direct Taxes			
Corporate Taxes	25,367	28,295	20,000
Personal Taxes	9,081	10,921	10,000
Mining Co. Taxes	1,259	2,312	1,725
Other	<u>1,303</u>	<u>1,278</u>	<u>985</u>
Total	37,010	42,806	32,710
Non-Tax Revenue	<u>19,188</u>	<u>18,569</u>	<u>25,235</u>
TOTAL	160,708	170,308	162,937

a. Provisional

b. Estimated

Source: Ministry of Development and Economic Planning, Annual Public Investment Programme 1979/80, p. 14.

capital is ultimately imported (industrial plant and equipment, agricultural machinery, fertilizers, petroleum), a downturn in international primary product markets results in both decreased national income and investment, thus further constricting the economy and/or necessitating increased foreign exchange borrowings.

Because revenues are also dependent on exports, government expenditure has tended to move in parallel with these market fluctuations, further exacerbating the impact on the economy. In any economy such as Sierra Leone's with a high propensity to import, a one unit increase in domestic credit (to counteract decreased revenues) tends to result in a one unit decrease in foreign exchange, since the expenditures which result from the credit tend to be either directly or indirectly on imported items.

Low rates of investment in agriculture, unstable world commodity markets, rising energy costs, general worldwide inflation, and government deficit financing of non-agricultural activities have all contributed to the failure of the agricultural sector to achieve its growth potential over the past planning periods.

4.4 WAGE AND PRICE STRUCTURE

When calculated on an opportunity-cost basis, or at the GOSL's mandated minimum agricultural wage, labor becomes by far the most costly factor of production, accounting for 70 to 80 percent of total production costs. The current mandated minimum is Le 1.74 per day. With meals, the cost of day labor in agriculture may rise to approximately Le 2.30. This represents nearly a threefold increase over the past five years, and interviews with farmers and IADP field personnel indicate that in some cases it is necessary to pay wages which exceed the announced minimum.

Labor shortages, even at these wages, are widely cited as a major current problem in agriculture. Two alternatives may account for this shortage. Either the minimum wage may be less than the market equilibrium price for labor, or the out-migration of labor, particularly young men, to the mining and urban areas has resulted in a shift in the supply curve for labor. The reality of the situation is probably a combination of the two. Labor migration is, in fact, taking place due to the expectations of higher incomes in the mining and urban areas. If the minimum wage were in fact the old equilibrium wage rate, the migration would result in either a shortage of agricultural labor at the minimum wage or a rise in wages. If the minimum wage has been set at a level lower than the prior equilibrium wage the agricultural labor shortage will be compounded. The fact that in some instances farmers provide meals in addition to wages suggests that the government's minimum wage for agricultural labor is below the equilibrium price.

Agricultural wage labor is relatively rare--most agricultural labor is still in the form of exchange. However, the opportunity cost principle does apply and the reported shortage of agricultural labor outside the cash economy reflects perceptions of greater returns to labor outside the agricultural sector.

Table 4-6. Development Expenditure in Agriculture 1973/74 to 1979/80, Sierra Leone

	1973/74 ^a	1974/75	1975/76	1976/77	1977/78	1978/79 ^b	1979/80 ^c
	(thousands of leones)						
Recurrent Expenditure	2,172	2,668	3,149	3,147	4,222	-	-
Development Expenditure							
Domestic funds	1,171	2,546	2,692	2,868	3,539	4,969	7,230
Foreign funds	2,009	2,120	2,917	4,847	11,114	7,423	13,323
Total	3,180	4,666	5,610	7,715	14,653	12,401	20,553
Recurrent and Development Expenditures	5,352	7,334	8,759	10,862	18,875	-	-
Percentage share of Agriculture of the total domestic development expenditure	11.4	12.8	17.7	16.0	20.8	17.5	15.7

a. 1973/74 through 1977/78: MDEP, 1977, p. 55.

b. 1978/79 and 1979/80: MDEP, 1979, p. 6 and p. 10.

c. Planned Development Expenditure

Table 4.7. Purchase and sales of major cash crops by Sierra Leone produce marketing board 1960/69 to 1977/78 in market value (1000 of leones)

	PALM KERNELS		COFFEE		COCOA		GINGER		TOTAL		Sales	S-P
	Purchase	Sales	Purchase	Sales	Purchase	Sales	Purchase	Sales	Purchase	Sales	Purchases	S
68/69	3976	5801	2772	2127	1087	3010	77	75	7912	11013	3101	28.15
69/70	3822	4724	2047	2328	888	1673	146	62	6903	8787	1884	21.44
70/71	4242	6217	3055	4010	1666	2627	157	373	9120	13227	4107	31.05
71/72	4050	4692	2424	6460	2106	2509	98	187	8678	13848	5170	37.33
72/73	3685	3715	3941	7729	2134	3305	95	189	9855	14938	5083	34.03
73/74	3770	6972	1433	6031	3278	7663	109	362	8590	21028	12438	59.15
94/75	7833	5912	4333	5520	3864	5909	197	221	16227	17562	1335	7.60
75/76*	6009	4236	3338	8062	4284	7905	308	372	13939	20575	6635	32.25
76/77*	3955	4432	14550	29180	9377	19115	621	940	28503	53667	25164	46.89
77/78*	5135	4270	7469	34172	10794	22233	693	1316	24091	61991	37900	61.23

* Provisional

Bank of Sierra Leone, Annual Report and Statement of Accounts for the year ending June 30, 1976, pp. 105-106.

Bank of Sierra Leone, Economic Review, Jan.-June 1978, Vol. 12, No. 1-2, Table 30-31.

While increases in real or imputed labor costs have resulted in a doubling of total production costs for rice, the price received by farmers has remained stable. The GOSL's policy of responding to perceived rice shortages through imports results in an opportunity cost of rice equal to the landed cost of imports. Between 1976 and 1980 this cost remained nearly stable. For example, 1976 CIF prices varied, depending on quality, between Le 310 and Le 410 per metric ton. In 1980 prices ranged between Le 332 and Le 417. The result has been a serious squeeze on producers' margins.

During the period 1973-78 consumer prices as measured in Freetown have been increasing at an average annual rate of 13.4 percent (Table 4.9). Since 1978 the inflation rate has been in the 25-35 percent range. This has an impact on other agricultural production costs as well, e.g. transportation costs, machinery and tools.

As previously noted, certain cash crops have recently enjoyed high prices and their production has been highly profitable. However, for food crops in general and rice in particular, the factor-product price relationships have been increasingly negative from the producer's standpoint.

4.5 CREDIT

A fundamental requirement for any significant participation by the agricultural sector in the economic development of Sierra Leone is a continuous flow of credit into the various stages of the production and marketing system. A 1979 study estimated the demand for agricultural credit in 1975/76 at Le 8,867,000 (Taylor, 1979). Private sector loans to agriculture have fallen far short of this (Table 4-9). Although savings and credit cooperatives make loans to member farmers, the funds made available to agriculture from these sources has been small. From 1960 to 1976, credit to farmers represented less than two percent of total credit provided by all financial institutions in Sierra Leone.

Non-institutional sources (e.g. moneylenders) are currently reported to supply much of the credit to farmers, and the high interest rates (effective rates often in excess of 100 percent annually) charged for these loans and the surplus extraction effects of SLPMB pricing policies leave very little in the way of resources which the farmer can reinvest in agricultural activities. The assets of commercial banks are not likely to become available to the agricultural sector due to several limiting factors, among which are the lack of collateral and the high administrative cost of a small loan relative to the size of the loan. Pending a major alteration of their investment pattern and criteria and the elimination of the legal and cultural constraints, the existing financial institutions and structure will provide only minimal assistance to the agricultural sector in general and to the small farmer in particular.

Credit to agriculture and within the economy as a whole must be reviewed within the control of its impact on the economy. As noted above, without proper management, an expansion of credit will result in a depletion of external resources, with the depletion ultimately equalling the amount of reserves held by the country (Taylor, 1979). Therefore,

Table 4.8. Index of Consumer Prices, Sierra Leone
(1961 = 100)

Period	All Items		Food and Drinks		Housing		Clothing		Miscellaneous	
	Freetown	Mining Area	Freetown	Mining Area	Freetown	Mining Area	Freetown	Mining Area	Freetown	Mining Area
1970	128.5	128.9	129.4	140.2	134.4	126.9	121.8	100.8	117.4	123.3
1971	126.3	125.1	124.1	133.2	136.6	122.7	122.5	101.8	119.2	124.5
1972	133.2	127.0	135.3	137.1	140.2	120.9	122.5	101.9	119.1	125.8
1973	140.8	133.2	147.5	151.0	141.1	124.7	122.5	102.3	120.5	126.2
1974	161.1	159.9	174.9	188.3	149.4	141.9	128.2	133.6	135.9	137.9
1975	193.2	178.2	215.5	213.4	177.3	162.5	137.6	147.6	151.2	143.7
1976	226.4	192.8	252.9	235.2	202.3	187.9	171.7	155.9	176.7	152.7
1977	252.8	203.0	271.3	244.4	215.7	211.6	205.4	184.4	159.9	158.1
1978*	263.3	221.3	286.3	270.7	233.1	223.3	261.3	217.1	247.9	159.3

* Provisional, based on one quarter.

Source: Bank of Sierra Leone, Economic Review, January-June 1978, Vol. 12, No. 1-2, pp. 34-35.

Table 4-9. Use of funds available to financial institutions in Sierra Leone 1960-1976*

	(1000 Le)																
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Money at call, cash in hand, balance with bankers in LS and head office	2496	2220	2274	1868	3278	4085	4982	5249	6318	8501	5949	5850	4725	9097	14862	10558	17209
Private sector Loans & advance:																	
Agriculture	54	76	-	-	288	1036	117	1810	1780	1083	125	181	350	362	335	710	679
Mining	-	-	-	-	1	320	579	143	177	415	345	525	454	1145	714	1151	1768
Crop loans	103	103	163	238	336	453	196	191	814	810	836	754	784	824	1347	1382	1410
Other	5406	6946	9984	13978	14372	13021	13712	13147	13732	14543	18138	17624	20476	24632	29878	34329	35319
Public sector						799	2358	3263	1923	997	4304	5115	3617	3600	13615	13907	13603
Purchase of G'vt securities by banking system	-	-	-	-	1158	8216	10604	11449	13126	11050	12682	9540	11952	17201	18681	43797	65199
Purchase of financial assets	15201	14103	15891	16156	18357	17940	16763	16230	25743	33317	29012	28841	36112	44366	52929	33750	36316
Other assets including fixed assets	4835	9803	7482	9140	9754	7227	6935	5321	15299	15149	18008	31704	36983	73512	101838	117225	140643
Total	28095	33251	35794	41380	47546	53097	55746	56803	78912	85865	89399	100134	11543	174717	234199	256809	312226
Loan to Agriculture As a percent of Funds available	0.19	0.23	0.00	0.00	0.61	1.95	0.21	3.19	2.26	1.26	0.14	0.18	0.30	0.21	0.14	0.28	0.22

Source: Adapted from Taylor, Alwin, "The Demand for and Supply of Credit in the Agricultural and Small Scale Industries Sector of the Sierra Leone Economy, Savings and Development, No. 1, 1979, pp. 34-35.

* The relatively larger apparent amount of loans to agriculture in 1967-69 in fact resulted from a loan to SLPMB to offset financial difficulties encountered during that period. After repayment of that loan in 1969 agricultural loans reverted to their previous level (Taylor, 1979).

care must be taken to insure that credit is used productively to minimize the loss of resources. Investment in agriculture meets this criteria. However, given the subsistence orientation of most farm production and the control of the farmers' crops by noninstitutional credit sources, a specialized institution is necessary to provide farmers with the incentive to undertake investment through borrowing that will yield significant increases in agricultural productivity. An appraisal of the situation and a creative institutional framework has been suggested by a study group on rural banking commissioned by the BSL (1980).

4.6 PARALLEL ECONOMY

The assessment of the macroeconomic environment for agriculture must include a reference to the "parallel economy", i.e., the illicit trade in exports, particularly diamonds, and the import of goods funded by such illicit exports. Although there are no current estimates of the quantity of goods moved through the parallel economy, sufficient references were made in interviews to its existence to warrant a consideration of its impact on agriculture.

While the illicit trade in diamonds has major implications for the overall financial and balance-of-payments posture of the GOSL, there are some specific agricultural manifestations and implications as well. The parallel economy for agriculture is purported to function in two ways. First, agricultural commodities are moved into Guinea and Liberia for currency sales. In addition to the potential for higher prices, Liberia offers the additional attraction of sales in hard currency. The second major system is the exchange of Sierra Leonean rice (or rice imported into Sierra Leone) for Guinean cattle, which are then marketed in Sierra Leone or trans-shipped to Liberia.

The permeability of the borders holds two policy implications for Sierra Leone's agriculture. For cash crops it is not possible for SLPMB to effectively tax at a rate higher than that determined by the market price in Liberia. Attempts to establish an effective price lower than the Liberia price will only result in no production or smuggling of the produce. With respect to rice production, policies to move toward self-sufficiency must recognize the interrelatedness of the rice markets and the potential for grain movement into the neighboring countries, either for cash sales or in-kind purchases.

CHAPTER 5

AGRICULTURAL INSTITUTIONS¹5.1 MINISTRY OF AGRICULTURE AND FORESTRY

The Ministry of Agriculture and Forestry (MAF) is the preeminent institution in the agriculture sector. It is comprised of the Divisions of Agriculture (field crops, tree crops, horticulture) and Forestry (including wildlife). The livestock and fisheries divisions, formerly combined with agriculture in the Ministry of Agriculture and Natural Resources (MANR), were separated in 1978 and now make up the Ministry of Natural Resources (MNR).

Structurally, the MAF is headed by a Minister, appointed by the President from elected Members of Parliament. The Minister is the Government's chief spokesman and referee for agricultural matters, and is responsible for overall Ministry policy and programs. Below the Minister is the Permanent Secretary (PS), appointed from the ranks of the senior civil service. His responsibilities include provision of shared services, e.g. administration, accounts, planning (implemented by the Planning, Evaluation, & Monitoring Services Unit, PEMSU), and assuring that the Minister is kept abreast of relevant developments. Because the managers of most donor-assisted agricultural projects report directly to the PS, he also has considerable influence over the Ministry's field operations as well.

The technical heads of the Ministry are the Chief Agriculturalist (CA) and Chief Conservator of Forests. The Chief Agriculturalist is, in turn, assisted by a Deputy and several Assistant CAs responsible for the implementation of the Agriculture Division's programs.

At present the staff of the MAF totals approximately 11,000, 1,000 in the Ministry Headquarters (administration and accounts, PEMSU), 9000 in the Agriculture Division, and 1,000 in the Forestry Division; of the total recurrent budget over 60 percent goes for wages and salaries. Over 80 percent of the total personnel are classified as "support staff"; within the Agriculture Division graduate agriculturalists account for less than 5 percent of the total.

5.1.1 Agriculture

The functions of the Agriculture Division include extension, research, plant protection, produce inspection and input supply. Of these the most important (in terms of personnel numbers and, therefore, budget) is extension---the technical personnel in the field, especially at the lower levels, are almost exclusively extension workers, charged with

¹ As this report is undergoing its final revision, a major study of the MAF is underway, supported by the World Bank, with a view toward its complete restructuring. For this reason the institutional setting for agriculture in Sierra Leone will be given only cursory treatment, sufficient to guide the reader through the remainder of the document. For a comprehensive institutional review the reader is referred instead to the upcoming World Bank report.

educating and assisting farmers and bringing them recommended new technologies.

Input supply is the other major field program of the division. There are presently two operations underway, tractor hire and fertilizer supply. The tractor hire program has several hundred tractors distributed throughout the country-side for custom plowing at heavily subsidized rates (perhaps one fourth of actual cost), primarily for rice production. The MAF is presently the sole authorized distributor of fertilizer and underwrites its in-country marketing costs, a subsidy of perhaps 30-40 percent.

Research is a relatively minor program, carried out largely in isolation at the Rokupr Rice Research Station. The MAF has no explicit research policy.

Agricultural field personnel are organized into a hierarchy differentiated entirely by level of administrative responsibility. There is no provision at any stage for technical specialization, nor for on-going contacts with agricultural research. Extension guidance and production inputs (seed and fertilizer) all emanate from Freetown downward through the hierarchy. There is little formal provision for feedback from the field regarding programs, problems or priorities. Entrance level in the hierarchy is determined by level of education. Thereafter experience can substitute for education up to a point.

The country is divided into four agricultural regions, plus Freetown (Western Area), each headed by a Principal Agricultural Officer (PAO) responsible for all agricultural programs in the region. The PAO may be assisted by a Senior Agricultural Officer (SAO).

Each region is then divided into five to seven administrative "circles", each headed by an Agricultural Officer (AO). Below the AO are the Agricultural Instructors (AIs--senior village level extension educators) and Agricultural Technicians (ATs--responsible for most of the direct contact with farmers)². The two induction training centers have a capacity of 120 new ATs per year. NUC has a training capacity of some 40 ATs per year.

The minimum qualifications for PAO and SAO positions include a B.S. in agriculture and considerable field experience. A B.S. is also required for AO positions although this requirement may be waived. Most professionals enter the service at this level. AIs hold Certificates in Agriculture from a special two-year curriculum; ATs go through a six-month training course at one of two induction training centers. All extension training at both levels is planned, directed, and, in the case of ATs, implemented by the MAF. The two-year AI curriculum is administered at and by Njala University College (NUC), the agricultural campus of the University Sierra Leone.

² The total number of ATs and AIs in the MAF and projects is not clear--records are not complete. It appears that there may be 10-15 in each circle, for a total of some 250-300. The attrition rate is probably 10 percent or more per year.

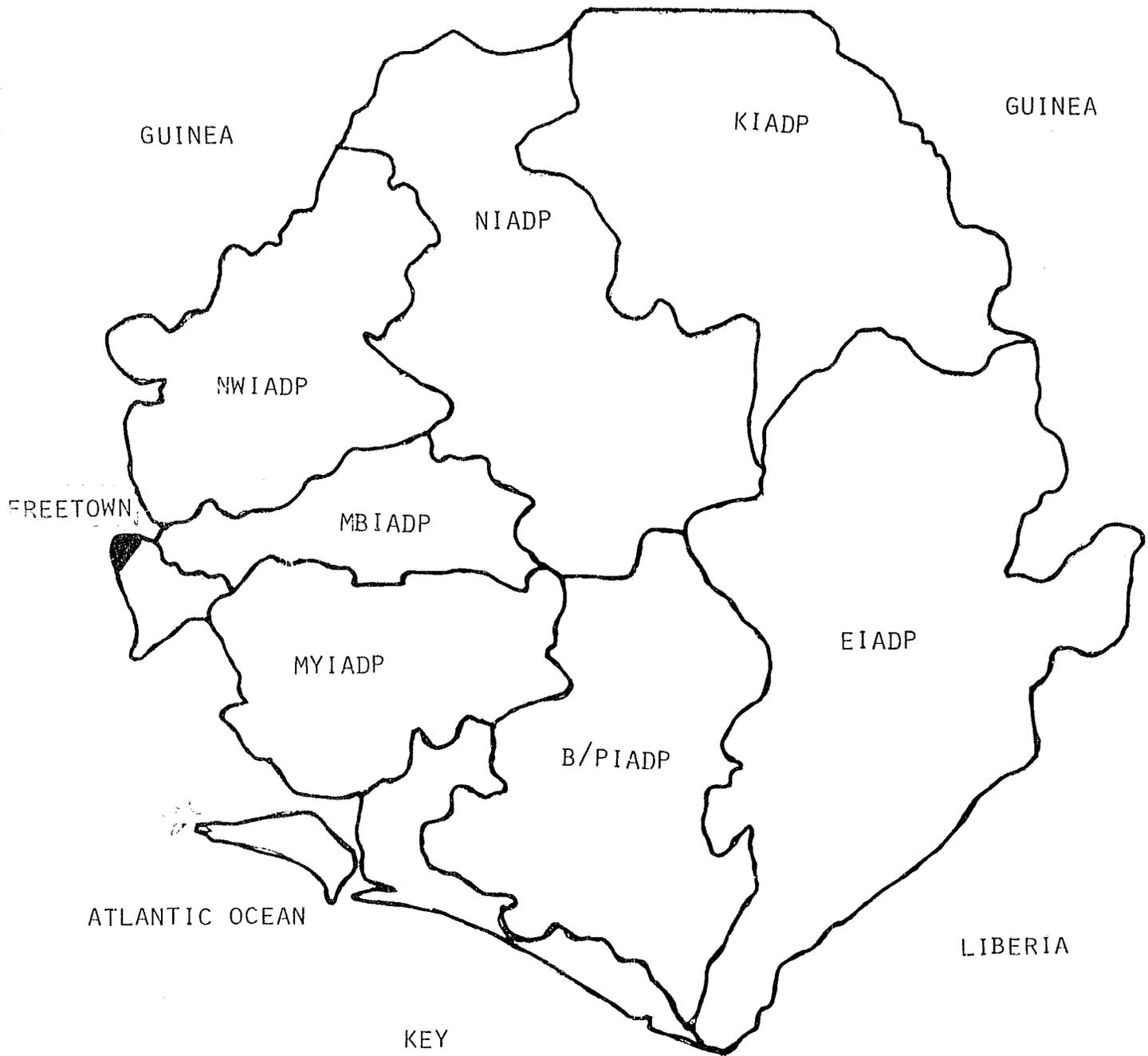
5.1.2 Projects

Distinct from the line structure of the Ministry are the various donor-assisted agricultural projects. The most important, and certainly the most visible, of these are the Integrated Agricultural Development Projects (IADPs). The first of these was initiated, with World Bank (IBRD-IDA) financing, in 1972 in the eastern agricultural region; subsequent IADPs funded by a variety of donors³ now cover almost the entire country. Map 5-1 shows the locations of existing and proposed IADPs. The objective of all the IADPs is to directly boost production through an integrated program combining an enhanced extension effort with specific production "packages" of improved seed, fertilizers and credit. In some IADPs the concept of "integration" has been extended to include feeder road construction and water supply. All are roughly similar in concept and content, with the primary emphasis on increased rice production. However, a degree of regional specialization is manifested, e.g. work on coffee and cocoa in the Eastern IADP and livestock in the Northern and Koinadugu IADPs.

In order to streamline administration and control all the IADPs are constituted as semi-autonomous bodies with direct access to the PS. For their staff they rely both on the assignment or secondment of officers from the MAF and on direct hiring. In some areas the IADPs exist alongside and distinct from the MAF field structure; in other areas the MAF program and personnel have been entirely subsumed within the IADP. The personnel structure of the IADPs roughly duplicates that of the MAF, i.e. a large number of support staff and a relatively small (albeit higher than the Division) percentage of graduate agriculturalists. The total staff of all IADPs is now almost 2,000.

Other major agricultural projects include the Land Resource Survey Project (FAO/UNDP-assisted, programmed for eventual institutionalization as the Land and Water Division of the Ministry); the West German-assisted Seed Multiplication Project; the West African Rice Development Authority (WARDA--a regional project that undertakes work at the MAF research station at Rokupr); the British ODA-assisted Extension Training Project (AT and AI-Level training, institutional and curriculum development); and the USAID-assisted Adaptive Crop Research and Extension (ACRE) Project. The ACRE Project, being jointly implemented with Njala University College, aims at improving the understanding and communication between researchers and farmers through a program of on-farm trials and demonstrations (thereby serving as a resource for all the IADPs) and at institutionalizing a coordinated national program of applied research. Almost all of these projects, like the IADPs, are distinct institutional entities, with differing administrative structures and conditions of service, and generally with direct access to the PS and/or Minister. The total staff of these projects is now nearly 1,000, of whom 3-4 percent are graduates.

³ Among them the UNDP/FAO, the IBRD-IDA, the European Economic Community, the International Fund for Agricultural Development and the West German Government.



KEY

- EIADP : EASTERN REGION
- KIADP : KOINADUGU
- NIADP : NORTHERN AREA
- NWIADP : NORTH WESTERN
- MBIADP : MAGBOSI
- MYIADP : MOYAMBA
- B/PIADP : BO/PUJEHUN

Map 5-1. Existing and Proposed Integrated Agricultural Projects, Sierra Leone.

5.1.3 Forestry

The Forestry Division of the MAF has as its program the economic and ecological protection of the natural vegetation and wildlife. Short term objectives include institutional and staff development.

The Forestry Division is headed by the Chief Conservator of Forests. He, the Assistant Chief Conservator and the Conservator are based in Freetown. The Assistant Chief is primarily responsible for administrative affairs; the Conservator is responsible for special projects, research and planning. The four Divisional Forests Officers carry out the programs at the field level, reporting directly to the Assistant Chief Conservator or Conservator. The Conservator of Forests is also directly responsible for operations in the Kenema office, which handles all timber processing concessions.

The Forestry Division of the MAF has not been blessed with the abundance of projects enjoyed by the Agriculture Division. The first concerted effort at a sub-sectoral overview and preliminary project identification was only undertaken in 1978. Perennially wanting for resources, it suffers a serious shortage of personnel and equipment. The 1978 Atlanta study revealed 74 (36 percent) of the 206 authorized technical positions to be vacant, and only four of twenty vehicles operational.

The Forestry Division formerly ran its own technical-level training school at Bambawo. This school has been closed, its function now assumed by the Mano River Union Forestry Training Institute in Liberia. Forestry training for Sierra Leone personnel is now pursued according to the following program:

<u>Level</u>	<u>Institution</u>
Professional (B.S.)	Britain, Ibadan (Nigeria)
Sub-professional	Ibadan
Ranger, Guard	Liberia

5.2 MINISTRY OF NATURAL RESOURCES

Previously part of the MANR, the MNR was created in 1978. It is not charged with the administration of resource policy as is suggested by its name; rather it is responsible for livestock and fisheries. Prominent among its responsibilities are veterinary services, livestock inspection and the range livestock stations at Musaia and Teko.

The basic structure differs little from the MAF. Like the MAF, the MNR is headed by a Minister supported by a Permanent Secretary. There are two technical divisions, livestock and fisheries, the latter dominated by the Marine Fisheries Section. The Livestock Division is responsible for production, inspection and veterinary services. The MNR does not have its own planning and analysis capabilities. It does maintain a limited field network of livestock production officers (most of whom are attached to the Northern and Koinadugu IADPs), inspectors and veterinarians. The total staff is approximately 1,200, over 90 percent of whom are classified as "support".

At the Teko Livestock Station there is a small breeding research program to evaluate the potential of crossbreeding the native trypano-tolerant N'Dama cattle with the larger, more productive Sahiwal breed imported from Kenya. This research is attempting to answer the key question of the proportion of N'Dama necessary to maintain trypano-tolerance. The Musaia Livestock Station is presently in a phase of rebuilding their N'Dama herds. It is basically production-oriented; no research is in progress at the present time.

The Fisheries Division has a small fingerling production station at Makali and some laboratories at their headquarters in Freetown. The Fisheries Division is also attempting to field a small inland fisheries extension network.

Like the Forestry Division of the MAF the MNR has not attracted much donor attention to date. It is associated with two of the IADPs that have livestock components; there is also a small USAID and Peace Corps-assisted program in inland fisheries development. A comprehensive livestock development study was only undertaken in 1978.

5.3 MINISTRY OF EDUCATION

The Ministry of Education is the administrative authority for Njala University College (NUC). The NUC faculties of Agriculture and Agriculture Education provide university-level training to the B.S. level in general agricultural as well as intermediate level extension training, and are responsible for research and extension activities in the five chiefdoms around Njala. NUC serves as the headquarters site and shares project implementation responsibility with the MAF for the ACRE Project.

5.4 SIERRA LEONE PRODUCE MARKETING BOARD

The primary responsibility of the Sierra Leone Produce Marketing Board (SLPMB) is the marketing of agricultural export crops from Sierra Leone. SLPMB is the only authorized exporter of coffee, cocoa, oil palm products, ginger, and other minor cash crops. Since the demise of the Rice Corporation in 1979, SLPMB has also had responsibility for domestic rice price stabilization. Within the domestic market for both cash crops and rice, SLPMB buys from producers through a system of licensed buying agents and sets official producer prices and marketing margins. With respect to rice, SLPMB attempts to administer producer and retail prices in conjunction with imports to maintain adequate rice reserves to meet domestic demand. Although private licenses to import rice have been granted in the past, SLPMB is currently the only authorized importer of rice for Sierra Leone.

In addition to its marketing activities, SLPMB currently supports a small extension program focused on the education of field personnel to provide technical assistance to producers of coffee and cocoa, improved and expanded husbandry of coffee and cocoa, and the exploration of the potential for other cash export crops. At this time, technical assistance for tree crop producers is directed primarily toward improved cultural practices on existing plantations.

5.5 MINISTRY OF DEVELOPMENT AND ECONOMIC PLANNING

The Ministry of Development and Economic Planning (MDEP) is responsible for the overall economic planning for the GOSL and is charged with the integration of the planned performance of the agricultural sector within the economy as a whole. MDEP regularly evaluates domestic economic and development performance and establishes and revises goals and targets.

5.6 NATIONAL AUTHORIZING OFFICE

The National Authorizing Office (NAO) is not a ministry level branch of the government but answers directly to the First Vice President. The NAO was originally created to deal specifically with all European Economic Community projects including the general review and evaluation of proposed projects and the solicitation of funding for new projects.

5.7 BANK OF SIERRA LEONE

The Bank of Sierra Leone (BOSL) is the central bank of the country, and, as such, its credit policies have a direct impact on the capital available for investment in agriculture and for the mobilization of savings throughout the economy. In the past BOSL activities have not been directed toward a specific impact on the agricultural sector; however, BOSL has recently developed a plan for the establishment of a rural banking system in Sierra Leone and is currently moving forward with this program. If successfully implemented, this system of rural banks would extend institutional credit facilities to farmers throughout the country.

CHAPTER 6

AGRICULTURAL SUB-SECTOR DESCRIPTIONS

6.1 CULTIVATION SYSTEMS

Although this report will describe the agricultural sector in terms of its commodity subsectors, it is essential to understand that monocrop cultivation such as that practiced in the U.S. is practically unknown in Sierra Leone, as in other humid, tropical countries. It is therefore more difficult to rigorously define and analyse specific commodity subsectors. It is hoped that a brief general description of the prevailing cultivation systems will better introduce the reader to the succeeding material.

6.1.1 Traditional Upland

The prevailing system of cultivation in the uplands (i.e., land not subject to periodic or perennial water-logging) is "bush fallow," in which an area of bush that has been lying fallow for between five and fifteen years is cleared and burnt. Crops are grown for one or two years before the plot is abandoned and a new one cleared. Soil fertility is thus built up during the fallow periods through accumulation of organic matter. The bush fallow system may be differentiated from true "shifting cultivation" in that the farmer does not move to new lands.

The bush fallow system may be characterized as follows:

- Short periods of cropping alternating with long fallow periods necessary to restore soil fertility. This results in a low intensity of cultivation per unit of land.
- Few or no inputs apart from land, labor and seed.
- Manual labor, often by women and children, using rudimentary tools.
- Simultaneous mixed planting of between six and twenty crops. This allows for better distribution of labor; more efficient use of land and water; easier control of weeds, pests and diseases; provision of a more varied diet; and a degree of insurance against failure of any specific crop (LRSP, 1979).
- Cultivation limited to the rainy season when sunlight constrains production.

The bush fallow system has been criticized as primitive, wasteful of resources and labor, and destructive of vegetation and soils. Nevertheless, it has supported African populations for thousands of years and can therefore be regarded as a delicate adjustment to prevailing environmental, economic and human conditions. It represents the optimal allocation of productive resources in the face of scarce labor and

abundant land under conditions of static technology and no population growth. However, when these conditions change the equilibrium may be upset, resulting in declining yields per unit of area.

Three-quarters of the cultivated uplands of Sierra Leone are in food crops with the remainder in perennial tree crops. Upland rice is by far the most important crop, accounting for about half of the area. Other crops (e.g., maize, sorghum, millet, sesame, broad beans, pigeon peas) are intermixed with rice. The proportion of grains other than rice increases with the decreasing quantity of rainfall toward the north.

Groundnuts and cassava are often planted in the second year after clearing. These crops are more common in the north than in the south and east. Groundnuts may have certain soil-enriching properties, but there is little evidence that this is considered in production decisions. Cassava is produced as much for the leaves, which are an integral and nourishing part of the local diet, harvested every few weeks, as for the root, which is often left in the ground against the possibility of future food shortages.

Vegetables are intercropped on the uplands and also grown in backyard kitchen gardens. The most common vegetables are pepper, okra, eggplant, and greens -- Amaranthis, sweet potato and crain-crain. Fruits such as oranges, mangoes, bananas, avocados, pineapple, breadfruit and guavas are grown around the family compound.

6.1.2 Swamp Cultivation

In 1975, the area of cultivated swamp was estimated at about 89,000 ha, mainly along the coast and in the bolilands (Spencer, 1979). This area has undoubtedly increased over the past ten years because of the GOSL emphasis on swamp development, but reliable current figures are not available. It is possible that less than 10 percent of the total swamp area is presently cultivated (LRSP, 1979).

Cultivation practices in the swamps differ markedly from those of the uplands. The fallow period is normally one or two years; in some areas, notably the mangrove swamps, continuous cultivation is practiced. Although paddy rice is the main crop, short-cycle crops such as groundnuts, sweet potatoes and vegetables are often grown in or bordering the swamps. Rice is normally broadcast or sown, with transplanting being limited to mangrove swamps and, locally, to inland valley swamps. Under traditional methods, inputs are limited to seed and labor and water control is not practiced.

With the exception of the bolilands, swamps generally have higher natural fertility and, particularly in the riverain grasslands and bolilands, lend themselves to mechanical cultivation. Farmers, however, traditionally favor upland cultivation for a number of reasons, the more important being the high initial costs (in terms of labor) of clearing the swamp; stated preference for upland varieties of rice; general lack of familiarity with swamp cultivation; and (very importantly) unhealthy working conditions in the swamps. There is some evidence that farmers will voluntarily take up swamp cultivation in the face of

population increases and consequent decreases in the availability of uplands. While yields from swamps are low under traditional methods, these can be increased with improved cultivation practices.

6.2 SUB-SECTOR DESCRIPTIONS

The following descriptions of the production and utilization of commodities in Sierra Leone are produced from available data and secondary sources using a step-wise analysis of inputs, outputs and allocations within the production/consumption system for each important commodity. The result is similar to a map showing the flow of inputs and outputs in each commodity sub-sector. This type of description readily identifies interrelationships occurring in the system and permits determinations of both the accuracy of existing data and the need for additional data collection. The descriptions are presented in text, tables of data, and graphic representations of flows within the sub-sectors.

Estimates of yields, production, and the utilization of inputs are based on available published data from a variety of sources and on interviews with individuals involved in agriculture. Accurate, reliable data are scarce, making analysis of the agricultural sub-sectors more subjective than desired.

Although reliable sources of information have been used in these descriptions, caution should be exercised in using specific values presented. For each sub-sector information is presented in the following order:

1. Primary production - sources and use of capital inputs, land, and labor for production and the amounts produced where estimates are possible.
2. Processing, transportation, and storage activities including energy, labor to supply commodities to ultimate consumers on farms in rural areas and for retail sales in urban areas.
3. Ultimate consumption - final uses for agricultural commodities.

The information presented in this chapter will be used as a base for the assessment and recommendation chapters.

6.2.1 Food Crops: Rice

Rice is the staple crop of Sierra Leone and therefore more information is available about the rice sub-sector than about any other. Agricultural development programs have concentrated on rice among the food crops, and other crops are thought of almost exclusively in terms of their relationships to rice production. According to Spencer (1979), about 85 percent of farmers in Sierra Leone produce rice on approximately 275,000 farms; per capita consumption is estimated at 115 kgs (FAO, 1979).

The Northern and Southern Provinces are the most important primary producing areas (Table 6-1). Primary production practices in Sierra Leone vary considerably; types of rice cultivation have been described by Spencer (1979).

Table 6-1. Rice production and consumption by area for Sierra Leone, 1975

District	Paddy rice production		Production available (milled rice) (tons)	Population	Per-capita consumption (kgs)	Total consumption (tons)	Surplus deficit (tons)
	Cultivated area (percent of total)	Annual area					
Southern Province	34.4	33.2	96,811	746,358	105	78,368	+18,443
Eastern Province	21.7	22.4	65,318	812,598	95	77,196	-11,878
Northern Province	45.6	44.1	128,596	1,191,699	96	144,944	+13,652
Western Area	<u>0.3</u>	<u>0.3</u>	<u>875</u>	<u>402,963</u>	<u>100</u>	<u>40,296</u>	<u>-39,421</u>
Sierra Leone ^a	100.0	100.0	291,600	3,153,618	99	312,205	-20,605

^aThe FAO Food Balance Sheet for 1975-77 is based on a population of 2,841,000 and a per capita rice consumption of 115 kg. This would require 326,715 tons of rice. This illustrates the data base variation problems that exist for Sierra Leone.

Source: GOPA, 1977, p. 20 and 24.

Upland rice cultivation predominates and is practiced on approximately 75 percent of the area under rice cultivation. It produces slightly more than half of the annual rice crop (Hugo, 1980). Cultivation is based on the traditional bush/fallow system described above.¹ There is little permanent land development in the upland system and the amount of labor required for soil preparation is essentially constant from year to year. Rice seed is typically broadcast onto the prepared fields. If weeding is attempted, it is usually done late in the growing cycle. Only one crop of rice is possible each year, but mixed cropping particularly with cassava, insures against the failure of a particular crop and provides valuable nutritional diversity to the diet not otherwise available under monocrop cultivation.²

Four variations of the upland system are reported, based on differences in yields due to soil and rainfall conditions and on the type of inputs used -- especially seed variety and fertilizer. Rice cultivation experiments indicate that weeding, improved sowing techniques and improved seed varieties can significantly increase yields (Table 6-2).

Table 6-2. Yield reduction in rice due to poor cultivation practice

Practice	Yield reduction
	Percent
No weeding	69
No fertilizer	57
Broadcast sowing	36
Interplanting with cassava	?

Source: Personal communication, Rokupr rice research program, 1980.

Flooded cultivation systems account for the remaining portion of Sierra Leone's rice crop. The most important of these is the inland swamp technique used on lowland swamps subject to rainy season inundation. Improved water control coupled with improved seed and increased fertilizer permits the highest yields. Under this system it is often possible to produce two crops of rice or other food crops annually. The development of inland swamps through drainage and application of improved inputs has been the major focus of rice development activity to date in Sierra Leone.

¹ Although bush/fallow is universally practiced in Sierra Leone research suggests that annual cropping may be possible with appropriate land management practices.

² Preliminary results at RRRS indicate interplanting with cassava may actually increase the yield of rice.

Similar results can be obtained using ground water flooding in the riverain (river flood plain) regions. By using mechanical cultivation, excellent returns per day of labor can be obtained in this area. The bolid lands (large depressions subject to periodic water logging) and riverain areas are the only regions suited for large-scale mechanized cultivation techniques. In both areas tractors can be used to prepare the land but water control is not practiced. Both broadcast seeding and transplanting are used to plant rice in these fresh water flood areas.

Mangrove swamp cultivation accounts for six percent of the cultivated area and 14 percent of annual rice production. This system requires large labor inputs, particularly for clearing. Water management involves fresh water flooding to remove salt water contamination and restore soil fertility. Rice is transplanted after flooding; crops are generally not weeded.³

Men and women perform generally well defined and socially accepted roles in rice production regardless of the technology or method employed. Men are primarily responsible for clearing, burning, and land preparation. Women do most of the weeding, broadcasting of seeds and fertilizer application. Both men and women harvest the crop. The introduction of new technology does not necessarily lead to a change in this division of labor. However, a technology that would intensify production can result in a relative increase or decrease in total labor by one of the sexes.

Land, per se, does not appear to be a limiting factor for rice production in Sierra Leone. It is generally agreed that additional land can be cleared and introduced into production. In fact, this is a major extension goal with regard to swamp areas. Rather, the limiting factor for land improvement appears to be labor. The clearing of mangrove swamps and the development of inland swamps both require large amounts of labor investment. This labor has been subsidized, through subsidized credit and food for work, to encourage swamp improvement that was not otherwise financially attractive to land owners.

Crop yields can be increased significantly through effective use of chemical fertilizers, although these use scarce cash reserves and represent a drain on foreign exchange. At present fertilizer is heavily subsidized (all internal distribution costs are underwritten by the MAF), but its use remains low. Imports over the past few years have ranged between 3,500 and 6,000 metric tons.

Insecticide use is also quite low due to cost and distribution problems. Chemical weed control is sometimes practiced in areas where labor is particularly expensive. Chemical control in the EIADP area has reduced weeding labor by 50 percent in experimental applications. Physical protection methods such as bird scaring by children are commonly practiced and seem to be relatively effective.

³ *Mangrove swamp development is environmentally questionable because severe soil acidity results when saline swamps are developed. The swamps must be periodically re-flooded to remove excess sulphur. The nutrient cycle is also disrupted by mangrove swamp development. Freshwater flows are increased during the rainy season, decreasing salinity and causing nutrients to be discharged directly into coastal waters. This makes adjacent offshore areas unsuitable for certain fish and shellfish (Tillman, 1980).*

If the results from the Eastern IADP are representative (MAF, 1979), primary crop production is very sensitive to supplies of labor and to competing labor use. In areas where coffee and cocoa compete with rice for harvest labor, farmers may prefer the longer season varieties (CP4) permitting the rice harvest to occur after the cash crop harvest. When labor is available, short season varieties (RHZ & CCA) permit two crops annually in the inland swamps. The relationships between the timing of activities for various crops (Figure 6-1) and the seasonability of rice harvest (Table 6-3) explain production activity interaction among crops. Primary production has increased significantly over the past twenty years as increased areas are brought into production (Table 6-4).

Most rice grown in Sierra Leone is consumed by the producer. Less than 25 percent of domestic production is commercialized outside the immediate production area. As a consequence on-farm storage is an important element in post-harvest crop management. Approximately five percent of paddy production is lost after harvest; seed requirements take an additional five percent. (Pre-harvest losses are estimated to be even higher than post-harvest losses).

Three common methods of storage are employed. Semi-dry panicle bundles are stored on a split bamboo ceiling where the cooking fire protects them from insect damage and dries the grain. Sun dried grain is stored in large baskets covered with dung, leaves and mud. This form of storage is most effective in preventing insect and rodent damage. Chillies are sometimes added to increase protection.

The third method, bag storage, is common both on farms and in the market sector, where it is the only method used. Bag storage increases with the use of mechanized harvesting and is essential to permit commercial movements. Unfortunately, rodent and insect damage is greater in bagged rice, necessitating the use of fumigants and traps. Losses in bag storage are estimated at one percent per month of storage (GOPA, 1977).

Storage should ideally permit a leveling of both prices and consumption, but this is not the case in Sierra Leone. Large storage facilities are limited (Table 6-5), and farm storage cannot handle large increases in rice production. The high degree of seasonability in production imposes storage needs that cannot be met with current facilities. Consumption increases at harvest when prices are lowest.

Rice processing includes milling, polishing and parboiling. Approximately 39 percent of rice used on the farms is parboiled, while 83 percent of milled rice is parboiled (GOPA, 1977). Most parboiling is done at the farm level using traditional cooking procedures and sun drying. A very small amount of rice is parboiled in large scale industrial operations.

Rice is milled by several methods. Most farm rice is hand pounded in a wooden mortar. This is a labor intensive process with good yield but producing a high percentage of brokens. Women do essentially all the milling at this level.

FIGURE 6-1 NOT INCLUDED

Table 6-3. Estimated seasonal distribution of rice harvest in Sierra Leone, 1975^a

Month	Upland rice	Swamp rice		Total rice
		(percent of total)		
August	3.5	---		3.5
September	21.0	---		21.0
October	35.0	1.5		36.5
November	10.5	7.5		18.0
December	--	10.5		10.5
January	--	7.5		7.5
February	--	3.0		3.0
Annual Total	70.0	30.0		100.0

^aDue to development of swamps, the proportions of upland and swamp rice in 1980 are approximately 50:50.

Source: GOPA, 1977, p. 21.

Table 6-4. Annual production estimates and area under rice cultivation in Sierra Leone

Period	Area ^a (000 ha)	Production estimates	
		WARDA ^a	Hugo ^b
		(000 tons)	
1960-65	296	312	309
1965-70	326	442	447
1970-75	423	580	477
1975-80	450	625	529

^aWARDA, Rice Statistics Yearbook, 1978.

^bHugo and Casavant, 1980.

Small scale mechanical milling operations have typically used steel roller mills which are much less efficient than newer rubber roller mills. Yields from steel mills may go as low as 60 percent, averaging 65.7, while rubber roller mills can yield as high as 70 percent (Table 6-6).

Table 6-5. Available rice storage warehouses, Sierra Leone

	Storage Available	
	GOPA 1977 Estimates	Rice Corp/SLPMB 1978 Estimates
	----- (tons) -----	
Freetown	20,000	33,000
Torma Bum	2,600	2,000
Mambolo	1,000	1,600
Bo	900	2,000
Moyamba	700	1,100
Other	---	---
Total large warehouse	25,200	44,700
Mechant small storage	<u>20,000</u>	<u>1,915</u>
Total milled rice storage	45,200	46,615
On-farm storage	315,000 (est.)	

Source: GOPA, 1977, p. 31 and Hugo, 1980, Table 15.

The movement of rice from rural to urban areas involves two distinct phases: collection from the farmer and movement between the rural and urban areas.

Table 6-6. Yields and costs of milling rice, Sierra Leone

Process	Yield (percent)	Cost/Ton (leones)
Hand pounding	68.4	50.40 ^a
Small mills		
Steel roller	65.7	20.00 ^b
Rubber roller	69.00	20.00

^aAt Le 1.35/day. It becomes Le 70 at Le 2.00 per day

^bMilling fee charged by processors.

^cApproximate yield.

Source: Adapted from GOPA, 1977.

Although data showing accurate volumes of marketed rice are not available, it has been estimated (GOPA, 1977) that about 100,000 tons of paddy are commercialized each year; most farms offer about 200 kg (approximately 6.8 bushels) for sale, although the mean is higher (370 kg) due to the effect of a few large commercial farms. Various sources place the marketable surplus at between 10 and 25 percent of paddy production. In a year of average production (500,000 mt), this would produce between 50,000 and 125,000 mt of paddy. This rice is collected through a marketing system dominated by about 500 grain wholesalers. Grain is usually purchased in villages by small traders acting as independent merchants or by employees of the grain wholesalers. The trader will purchase 80 percent of his grain from farmers within a 30 km radius. Farmers headload rice to the village for sale (Table 6-7) and because they are generally reluctant to transport the grain back to the farm will often accept whatever price is offered. Only about 10 percent of rice is purchased at the farm by itinerant merchants.

Table 6-7. Methods used to transport marketed rice, Sierra Leone

Region	Headload	Method used (Truck)	Other ^a
(percent of regional marketing)			
Southern	49	28	23
Eastern	44	45	11
Northern	60	16	24
Western	<u>70</u>	<u>10</u>	<u>20</u>
Sierra Leone	51	30	19

^aIncludes boats and bicycles.

Source: Adapted from Hugo and Casavant, 1980.

The farmer's position vis-a-vis the trader is further weakened through the use of credit. By advancing credit, a trader can insure a rice crop will be sold to him. It is estimated that between 20 and 50 percent of the annual crop is controlled by traders through this method, limiting the effect of government purchases and price policy.

GOPA (1977) summarizes the problems in rice collection as follows:

1. Relative monopsony by traders.
2. Credit resulting in forced sales.
3. Poor farm-to-market transportation.
4. Ineffective government policy.

The distribution of rice is handled through a system of wholesalers, retailers and market women. The structure of the channel is shown in Figure 6-2.

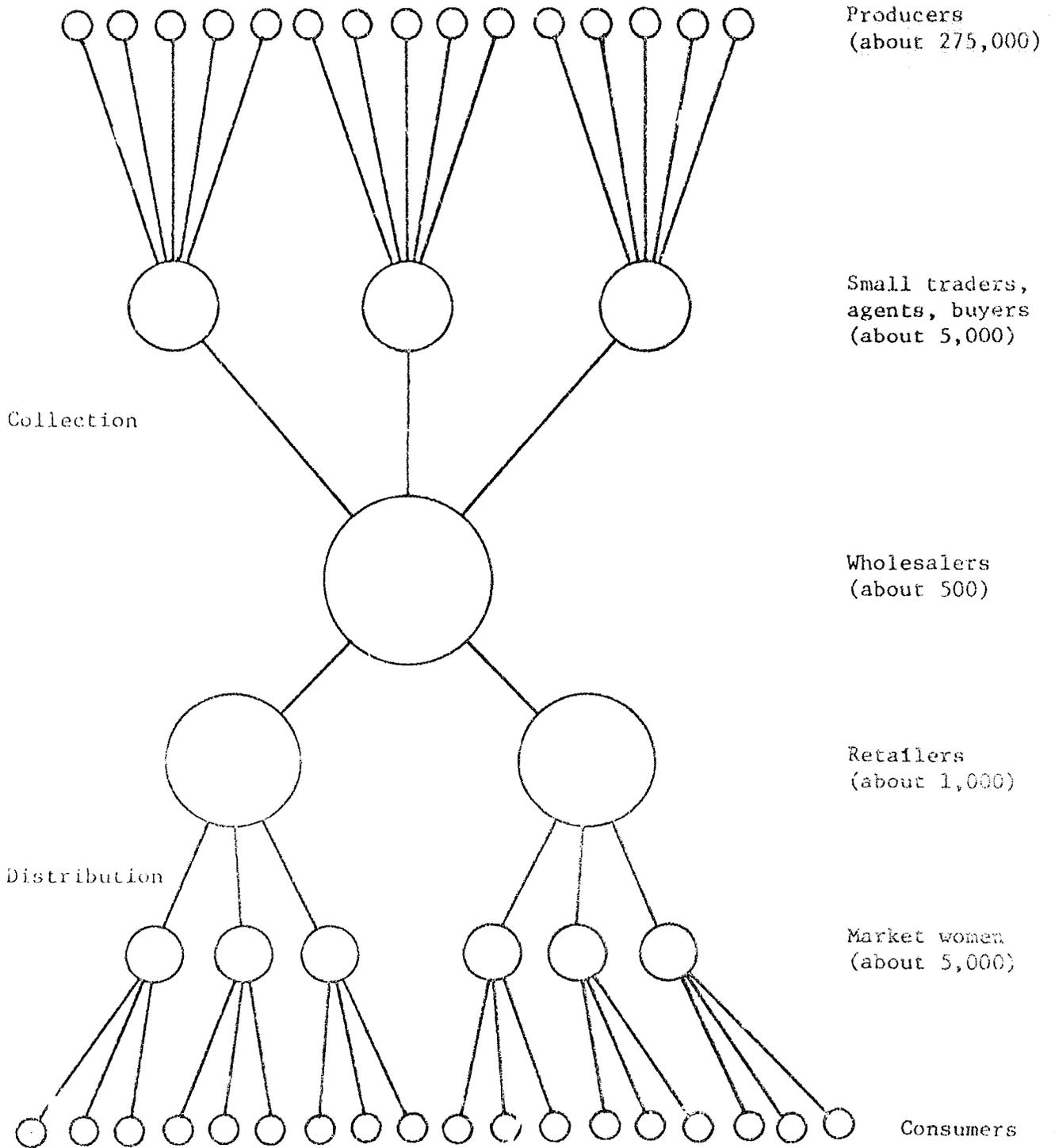


Figure 6-2. Rice collection and distribution channels, Sierra Leone.

Source: Adapted from GOPA, 1977, pp. 26 and 41.

Approximately 1,000 traders are involved in wholesale and retail operations. More than 5,000 women function as actual retail sales outlets. Wholesalers handle approximately 50-150 tons annually which is sold by market women in 10 oz cups.

The GOSL through SLPMB imports rice to supplement domestic production and control prices. As a result, rice imports have risen to provide nearly 50 percent of marketed rice. Government rice purchases and imports are shown in Table 6-8.

Market costs and markups (Table 6-9) do not appear to be excessive except at the retail level where, because of the large number of market women and the small scale of operations, high markups are encountered. The price of rice in Freetown has risen dramatically in recent years despite increased importation by the GOSL (Table 6-10).

Table 6-8. Rice purchases and imports, Sierra Leone, 1975-80

Year	Production	(000 tons) Imports	Government Purchases
1975	297	--	11
1976	304	3.9	1
1977	317	16.5	1
1978	336	18.2	--
1979	340	120.0	--
1980	344	55.0 est.	--

Source: Adapted from GOPA, 1977; Hugo and Casavant, 1980. 1979, imports from Director, SLPMB.

Table 6-9. Rice marketing wholesale/retail/margins, Sierra Leone, 1977

	LEONES	
	Per bushel	Per Ton
Farm price	7.00	159.00
Milling cost	.62	22.94
Clean equivalent (65% yield)	11.72	433.64
Storage loss (5%)	.59	21.83
Bags	.13	4.81
Transportation (80 mi.)	.36	13.32
Storage fees	.20	7.40
TOTAL COST	13.00	418.00
Freetown consumer price	25.76	953.12
Marketing margin	12/76	472.12

Source: Adapted from Magbosi IADP, staff working papers, 1979, p. 23.

As the staple crop in a largely subsistence agricultural economy, most rice is consumed by the producers. Per capita annual rice consumption is estimated between 100 and 125 kg. Rice purchases account for 39 percent of the average family income (Byerlee, 1977) and represent more than half of the average food budget. There appears to be considerable latent demand for rice as the expenditure elasticity is .95 at the mean income level and exceeds 1.2 for the lowest income decile. As population and incomes continue to increase, demand for rice seems certain to outstrip production for the near future.

Table 6-10. Sierra Leone rice prices, 1975-1980 (Le/ton of clean milled rice)

Year	Import price	SLPMB price ^a	Market price ^b	Government farm price ^c
1975	NA	350	401	276
1976	NA	440	448	276
1977	264	413	450.5	246
1978	NA	NA	NA	276
1979	336	556	NA	304
1980	405	NA	927 ^d	414

NA = Not available

^aSold in 50 kg. bags.

^bSold in 10 oz. cups.

^cCorrected to 67 percent milling yield.

^dEstimated from market surveys.

Source: Adapted from Hugo and Casavant, 1980.

6.2.2 Food Crops: Cassava

Cassava is a secondary crop in Sierra Leone, supplementing the more desirable rice. It is in fact two crops, leaves and roots. Cassava has little market impact outside the auto-consumption cycle.

Cassava is often grown with rice in upland plots or in drained swamps where rice is not planted. It is never grown as the primary crop. In 1969-70 it was estimated that 61.3 percent of farmers in Sierra Leone grew cassava but fewer than 10 percent marketed any. Since cassava is not generally planted in pure stands, yields are difficult to estimate. In 1964-65, an estimated 159,515 ha of cassava were planted, approximately 53 percent of the area planted in rice. FAO estimates (1980) of production were 83,000 tons, yielding 74,000 tons of food products. Based on these admittedly disparate estimates, yields are approximately .52 ton/ha.⁴

⁴ This low yield estimate may reflect inaccurate data; low yields also result from intercropping.

Actual EIADP (1979) estimates indicate that yields could be increased five fold without reducing rice yields.

Women are generally responsible for cassava cultivation, with some regional and ethnic variations. Since cassava is usually inter-cropped on the uplands, men do the initial land preparation.

Cassava leaves are sliced finely and boiled with spices for use as a sauce. Cassava root is grown primarily as a hungry season crop since it can easily remain in the ground for months without rotting. When needed it is boiled and pounded into fufu or grated and fermented into gari.

An extremely small percentage of cassava tuber production is commercialized; marketing is usually done by the women growers themselves. Cassava leaves are similarly marketed, i.e. by women who headload their crop to market towns.

Cassava tubers may also be sold on the farm to traders or to fufu and gari makers who sell to retailers or directly to consumers primarily in Freetown markets. The role of the commercial sector (wholesalers) in the distribution of cassava is very limited.

Cassava helps fill the shortfall between rice production and demand. It contributes four percent of total calories, with consumption of approximately 26 kg per capita. The price series data for fufu indicate that it competes with domestic rice. Cassava price in 1978 was estimated at Le 80 per ton in the ground or Le 164 farmgate (MAF, EIADP-3, 1979). The consumer price in 1978 was approximately Le 180 per ton.

6.2.3 Food Crops: Groundnuts

Although groundnuts are grown as a cash crop in many parts of West Africa, in Sierra Leone they serve primarily as a food crop. A local variety known as "Mares" is the predominant type grown; it has the characteristics of the Spanish type. Groundnuts are grown mainly in the Northern Province.

Although groundnuts were exported in the early 1950's production has fallen and all the nuts currently produced are consumed domestically. There is no surplus available for oil extraction; palm oil is the preferred oil source.

Groundnuts are almost always a woman's crop. According to Spencer, women provide 63 percent of the total labor required for groundnuts. Male labor, used for clearing and burning, is often paid labor. Once the land is ready for cultivation, women are responsible for planting, weeding, harvesting, processing and marketing the crop.

The basic inputs used in the production of groundnuts are labor, traditional hand-tools, mats and seeds. Fertilizers and insecticides are seldom used. The production of groundnuts is purely labor intensive; after the soil has been hoed, the seed is dropped into holes made by the hoe and covered by the farmer's feet as she moves along. Weeding is also done by hand.

In Sierra Leone, groundnuts are grown in kitchen gardens or in fields interplanted with maize, cowpeas, cassava, peppers, and okra. In conjunction with swamp rice development, farmers are encouraged to plant groundnuts on the sides of swamps during the rainy season and in the swamps during the dry season. Groundnuts do have nitrogen-fixing properties and can improve soil fertility. However, there is reason to believe that varieties currently in use do not add large amounts of nitrogen to the soil.

Groundnuts are also increasingly grown as a second crop in northern upland areas where they are well suited to the longer dry season. Government programs are currently providing seeds and fertilizer to encourage primary production. In 1965, groundnuts were planted by 34.2 percent of farmers, almost exclusively in the north. Commercial groundnut production is planned by the National Agricultural Produce Company for 15,300 hectares.

The first crop is usually planted during the early rains, around the end of April. In most cases, it is lifted before the pods mature. The main harvest takes place from September through November. The soil remains wet, thereby enabling lifting to be done by hand. Since labor is scarce, heaps of stems with pods uppermost are often exposed to both rain and sun for several days. As a result of this exposure, drying takes a long time. In some cases, however, the nuts are stripped in the field and then taken home where they are dried on mats and sheltered from rains. The dried pods are bagged or put into large baskets and taken to local markets or sold directly to petty traders. A proportion of the crop is retailed for seed.

Data on yields are very difficult to obtain, but SLPMB officials hold that they are relatively low even in the main growing areas - around 1,100 kg/ha. Nevertheless, groundnuts have the potential of being grown at a high level of productivity if husbandry, harvesting, drying and storage methods are improved. Yield figures obtained from various sources are shown in Table 6-11.

Almost all the groundnuts produced, except those retained as seeds, are consumed locally. Although groundnuts are often considered a cash crop, only 22 percent of cultivators sold a portion of their crop. (This is not significantly different from the percentage of rice marketed). Most of the groundnut crop is purchased by private traders; government influence in this sub-sector is negligible. The market value of groundnuts is approximately Le 220 per ton.

The kernels are consumed as a local confectionary after boiling or roasting. Roasted nuts are also pounded into a paste and used as an ingredient in sauces. Approximately 14 kg of groundnuts are consumed annually per capita. They are a valuable dietary supplement however consumed.

6.2.4 Food Crops: Garden Vegetables

Vegetables are grown in backyard kitchen gardens and inter-cropped on upland fields. Nationwide, about 80 percent of farm families have vegetable gardens.

Garden crops are almost always the sole responsibility of women, although male labor again is needed for clearing and land preparation. Women produce, process and market vegetables and usually keep the income from their sale. Hence, vegetable crops not only add considerably to the family's diet, but also provide a source of income for women.

Table 6-11. Groundnut yields in Sierra Leone

Region	Yield (tons/ha)
Northern Province	1.1 ^a
Southern Province	0.6 ^a
Makeni	1.1 ^b
Bolilands	2.0 ^c
Northern Plateau	1.3 ^d

Sources: ^aEstimated 1970-71
^bFAO 1969.
^cNjala/Michigan survey 1964-75

Backyard gardens usually consist of greens (cassava leaf, sweet potato leaf, crain crain, spinach and sawa-sawa), peppers, okra, onions and tomatoes. Sometimes groundnuts will also be planted.

Vegetables are grown year-round in backyard gardens, during the rainy season on the uplands, and during the dry season in the swamps. The drier and somewhat cooler northeast region of the country (Koinadugu District) is the most suitable for commercial vegetable production, but presently suffers from very poor access and consequent high marketing costs. Vegetable yields are approximately 10 tons per hectare with an estimated market value of Le 440 per ton. The Magbosi IADP (1978) proposal suggests these yields can be increased 60 percent through improved cultivation practices.

Greens are boiled, pounded and mixed with dried fish, peppers and spices in a local dish. Other vegetables are used in various sauces served over rice.

Most vegetables are consumed by the family. Any surplus which cannot be stored is sold on the local market by the women. The major vegetable growing areas are Koinadugu, Lungi, Port Loko and Wellington. There are also sizeable gardens in the center of Freetown which specialize in fast-growing (3-4 weeks) greens. Other vegetables grown specifically for the Freetown market are lettuce, cabbage, cucumbers, and spring onions. Women predominate even in large scale vegetable production. For example, in Koinadugu, two "Mrs. Farmers" are responsible for growing and marketing almost half of the vegetables. Usually women have access to family land or they may rent. They use labor intensive methods of cultivation and some irrigation, fertilizer and improved varieties. Surveys of farmers in both the Kabala and Freetown-Wellington area indicated that the greatest constraint to production was the unavailability of seeds.

Women wholesalers from Freetown buy the produce, often negotiating a price before the harvest. The vegetables are transported to Freetown for resale to women retailers.

Most vegetables are highly perishable and since storage facilities are virtually non-existent there is an extremely rapid turnover of stock. Most women store their produce in their homes.

6.2.5 Cash Crops: Coffee

The principal coffee growing area in Sierra Leone is in the Eastern Province, where it is primarily concentrated in a zone 40 kms wide running along the Moa River south of Kenema to northeast of Kailahun. There are also some scattered plantings of coffee in the southern part of Kono District.

The average annual rainfall in the Eastern Province is 250-275 cm with approximately 96 percent of the total coming between March and November (see Figure 2-2). During the dry season coffee plantings may be subject to drought stress just when flowering and fruit set are occurring. The mean temperature ranges from 25.0° to 26.1° C with the highest temperatures occurring during the dry season and thereby adding to the drought stress. Overcast skies during the rainy season limit the sunlight needed for good coffee production.

The soils are shallow and contain excessive amounts of ironstone or ironstone panning. Heavy leaching of soil nutrients has occurred and pH values are below 5.0. However, coffee will tolerate the poor soil conditions reasonably successfully. Inputs such as fertilizer and insecticides are not currently in wide use. The major inputs are labor for clearing and harvesting, facilities used for drying, sacks for shipping and transportation.

The primary agricultural activity of the region is subsistence farming with rice as the principal crop. Farmers also cultivate cocoa, citrus, kola, oil palm and various other subsistence crops.

A 1977 census of the Eastern Province estimated the acreage of pure coffee plantings at 29,000 ha with about 1,100 ha planted to mixed stands of coffee and cocoa. The census data appear unreliable with respect to the average acreage of a typical coffee holding. The RTI report assumes 1.2 ha of coffee as reasonable (RTI, p. 20-22).

Virtually all coffee plantings are Robusta (*Canephora*), established from unselected seed. Most plantings are irregularly spaced about five feet apart with about 4,300 plants per hectare (RTI, p. 26). Often plantings are so heavily shaded that production and development are adversely affected. Close spacing has caused the trees to develop irregularly; stems are too high, virtually all of the lower primary branches have been lost and there are few terminal branches, greatly reducing the yield.

Little systematic pruning is undertaken and the trees are allowed to reach such heights that picking is impossible without some damage to the crop. Pests are not currently a problem although there are some instances of fungal attack (*Fussarium Stiborder* or *Colletotrichum Coffearmim*), stem borers and termites.

According to the RTI report accurate figures regarding average yields of clean coffee per acre are not currently available. Considering the poor quality of both the soil and the coffee stands, RTI estimates the yield at around 220 kg per hectare, ranging from 0-112 kg/ha on poorer plantings to 225-335 kg/ha on the best plantings.

Small coffee holdings appear to fit well into the subsistence agriculture structure predominant in the region. There is, however, some conflict between land preparation for upland rice cultivation and the coffee harvest. Because both occur during the dry season, farmers may need to hire additional labor to assist with the coffee harvest (see crop calendar, Figure 6-1).

Harvesting is done by hand. Berries are sun dried and no pulping or fermenting is done. Dried berries are hulled to remove the skins and parchment; mechanical hullers are now in common use.

Clean coffee is sold to an SLPMB agent or his representative at a price linked to world market prices. An example of the SLPMB price structure and marketing overheads for coffee is shown in Table 6-12. The coffee is shipped as quickly as possible to minimize losses from insects and mold which come with the rainy season.

The SLPMB, in cooperation with the MAF, has undertaken a two year program of coffee extension work in the Eastern Province, primarily pruning and fertilization. The program, however, is reported to be encountering, at best, indifference on the part of the producers.⁵

Sierra Leonean coffee exports represented less than one percent of the world supply of coffee in the crop production year 1978-79. Export increases by Sierra Leone would not, therefore, be expected to produce a significant response in world market prices.

The domestic demand for coffee in Sierra Leone is quite low and represents an insignificant proportion of current or potential output. World demand for coffee is projected to grow slowly during the 1980's while world market prices in constant dollar values are projected to decline (World Bank, 1977). The 1985 projected price for Sierra Leone coffee in constant 1978 dollars is only 45.1 percent of the 1978 price.

6.2.6 Cash Crops: Cocoa

The principal cocoa producing region of Sierra Leone is also the Eastern Province; however, the soils suitable for cocoa are much more restricted than are those suitable for coffee. They occur mainly along river and valley bottoms where alluvial and colluvial deposits form.

⁵ *This apathy may derive from two sources: in the past, producers may have been misled regarding the conditions under which assistance was provided. Once charged for "free" services, farmers become quite skeptical of future "free" programs. Second, the negative cash flow in the early periods of coffee projects probably discourage the greater investment required under the extension program.*

Table 6-12. Sierra Leone Produce Marketing Board price structure and Marketing overheads for coffee (leones per ton)

	Actual 1976-77	Estimate 1977-78
1. Producer price	1,612.80	1,612.80
2. Buying agents commission	70.00	76.63
3. Porterage	5.80	5.80
4. Harbour dues	0.61	0.61
5. Road freight	15.00	15.00
6. Administration costs	<u>17.80</u>	<u>17.80</u>
7. Sub-total	<u>1,722.01</u>	<u>1,728.64</u>
8. Export duty (40% F.O.B.)	1,867.40	
9. Average export price (F.O.B. Freetown)	<u>4,693.48</u>	<u>3,588.17</u>
10. Net financial revenue (Item 9 minus 7 & 8)	<u>+1,104.07</u>	
11. Agric. development fund 8.5% of F.O.B. price)	398.95	
12. Price Maintenance Fund (5% of F.O.B. price)	<u>234.67</u>	
13. Surplus/Deficit (Item 10 minus 11 & 12)	<u>+470.45</u>	
14. Average economic revenue (before shadow pricing adjustment) (Item 9 minus 2-6)	<u>4,584.27</u>	<u>3,472.33</u>
15. Average economic revenue (after shadow pricing adjustment)		3,483.05

Source: RTI, Annex 12, Section 2, table 1.

Like coffee, high temperatures and low precipitation during the dry season can produce drought stress in cocoa plantings while the overcast skies of the rainy season limit the sunlight needed for optimum growth and production. The rainy season also provides a favorable environment for cocoa pests, particularly those associated with black pod disease.

Commercial inputs such as fertilizer, insecticides, and fungicides are not widely used in cocoa production in Sierra Leone, and their absence results in a significantly lower output. The primary inputs are labor for clearing, picking and processing, sacks for storage, and transportation.

The 1977 census estimated the acreage of pure cocoa at about 39,000 ha although much of this land is not well-suited to the crop. About 1,100 ha is planted to mixed stands of coffee and cocoa. More than one variety of cocoa may be found in the region. 'Amelonado' was planted during the 1930's and 1950's; during the 1960's the hybrid 'Upper Amazon' was planted and today represents about 10 percent of the current cocoa holdings in the region. Most cocoa plantings average approximately 1.2 ha; only one of 45 ha was encountered in the census (RTI p. 22).

While cocoa, like coffee, fits well into the subsistence agriculture structure of the regions, there is the same potential for some labor conflict in the timing of activities in that cocoa stands should be cleared for disease control at the same time land is cleared for rice production.

Older cocoa plantings were at 4,300 trees per ha, but later ones were at approximately 1,200 trees per ha. The older stands are also heavily shaded. Little pruning is undertaken in most of the stands. The close spacing and heavy shade has resulted in the formation of the cocoa canopy at a height of about 18 meters, which makes harvest difficult.

The small tree girth and shallow canopy formation prevalent throughout the cocoa stands result from the combination of poor soils, less than favorable climatic conditions, and poor husbandry and management, particularly shade control.

Disease and pest control in the cocoa stands is more critical than for corresponding coffee holdings. Black pod (Phytophthora Palmivora) and Capsid (Sahlbagella Singularis) are the principal pests. Evidence suggests that spraying for Capsid may not be justified, as the populations do not appear to be critical. Further observation is needed in the entire area of disease control in cocoa. Squirrels also contribute to pod damage and in areas near extensive forest monkeys may inflict a severe loss of pods. However, losses due to disease far exceed losses due to animals.

Harvesting is done between October and December in a series of 7-10 day cycles. The mid-year crop of cocoa which occurs in the period April-July is normally not harvested as it matures when farmers must brush and clear land for upland rice.

The quality of cocoa depends upon the quantity of beans fermented and the management of the fermentation process itself. Larger quantities result in better fermentation due to the greater amount of heat generated. In Sierra Leone, cocoa beans are generally fermented by individual farmers in small quantities thus lowering quality.

After fermentation, the beans are sun dried and sold to an SLPMB representative. The domestic purchase price is set by the SLPMB after Ghana and the Ivory Coast have announced their prices. There is, however, no assurance that the farmer receives the announced price; interviews with field personnel indicate that he most likely receives a lower price. If the price is coupled with a credit repayment agreement, it will be lower still. An example of the SLPMB price structure and marketing overheads for cocoa is shown in Table 6-13.

The accuracy of figures for the yield of dry cocoa per acre in Sierra Leone is questionable. Based upon average yields in other areas of Africa and general husbandry practices and soil conditions, the RTI report suggests that a 225-280 kg/ha yield may be reasonable (RTI, 1978).

The SLPMB is currently carrying out a two year extension program in an attempt to demonstrate the yield benefits to be derived from weed control and disease/pest management. They are, however, encountering resistance from the farmer, probably for the same reasons as coffee extension.

Institutional credit for cocoa producers in the Eastern Province is available through the Farmers' Finance Corporation; however, the loans available (Le 370 per ha) are not large enough to stimulate commercial undertakings in cocoa.

Although about two thirds of the world's cocoa comes from Africa, cocoa production by Sierra Leone is negligible. Supply increases would not produce any significant response in world market prices.

Since there are no processing facilities for raw cocoa in Sierra Leone, there is no domestic demand for locally-produced cocoa; the entire crop is sold by the SLPMB on the world market. World market demand is projected to grow at approximately 3.75 percent per year up to 1985 (RTI, 1978). World market prices for cocoa in constant dollar values are projected to decline over the next 20 years (World Bank, 1977).

6.2.7 Cash Crops: Chillies

Although chillies are important in the local diet and also have export potential they have been ignored in the agricultural development and research areas and there is little published information on their cultivation requirements. Yields are reported at about 0.4 ton per ha. In monoculture, intensively managed plants should yield much more. Total annual production, estimated at 2,212 tons, is low in terms of the national needs.

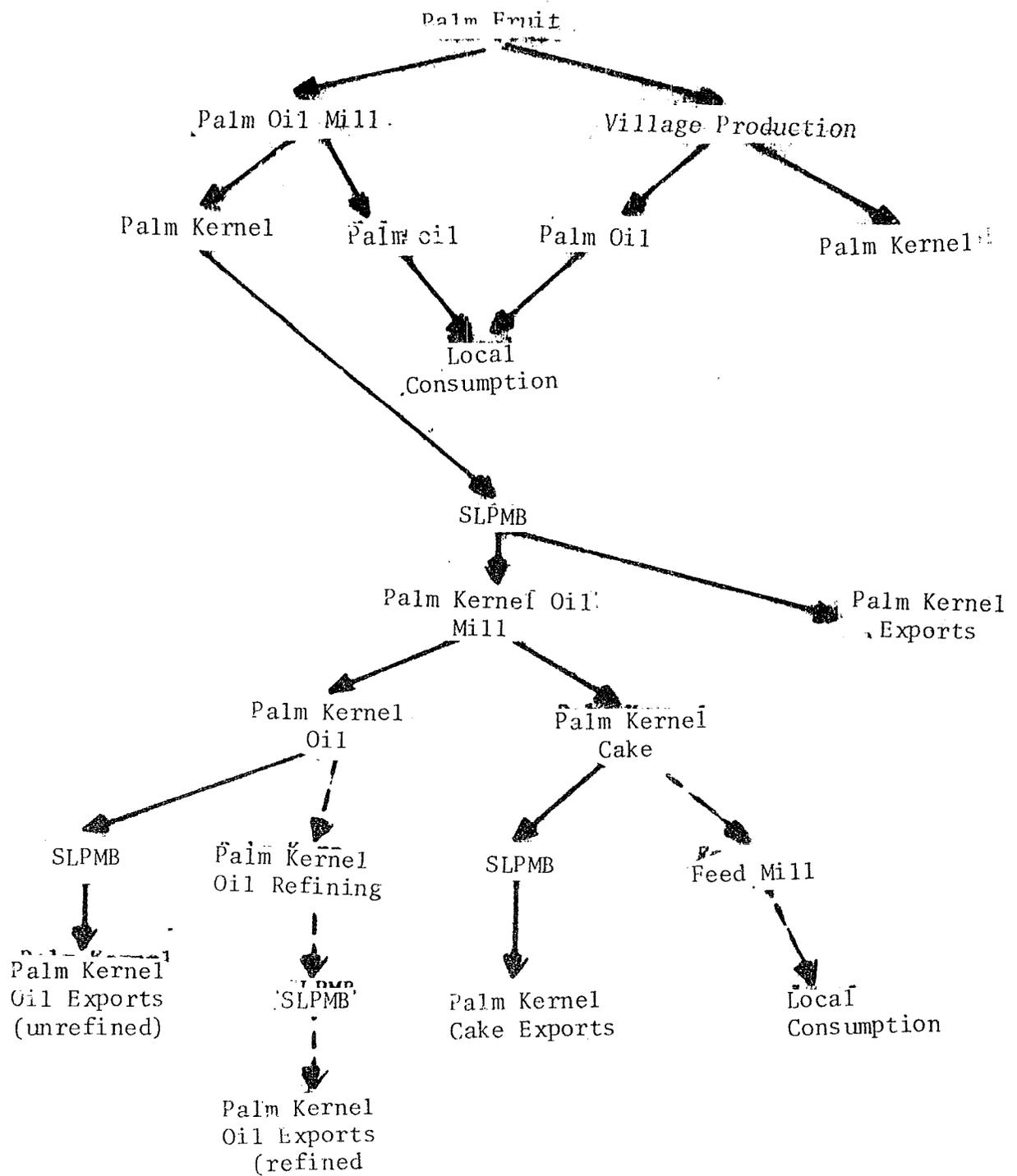
Two varieties of chillies are grown in Sierra Leone. Capsicum frutescens is extremely pungent. The short, narrow fruit are picked when mature and sun dried. Capsicum annuum is irregularly-shaped, multi-colored (orange, red or green) and mildly pungent. Fruit are normally picked as the color turns and marketed fresh.

Seed from harvested fruit are sown in a seed bed and transplanted when the seedlings are 15-20 cm tall. They can be planted with rice at weeding or harvest time, or in mixed cropping with corn, cassava and other vegetables. Chillies can be grown after rice during the dry season. Spacing in monoculture is about one meter between rows and 0.6 meters between plants, or about 17,800 plants per hectare.

Table 6-13. Sierra Leone Produce Marketing Board price structure and marketing overhead for cocoa (leones per ton)

	Actual 1976-77	Estimate 1977-78
1. Producer price	1,209.60	1,568.00
2. Buying agents commission	56.14	73.04
3. Porterage	4.80	4.80
4. Harbour dues	0.61	0.61
5. Road freight	16.00	16.00
6. Administration costs	<u>17.80</u>	<u>17.80</u>
7. Sub-total	1,304.95	<u>1,680.25</u>
8. Export duty (40% F.O.B.)	1,119.14	
9. Average export price (F.O.B. Freetown)	<u>2,998.34</u>	<u>2,427.23</u>
10. Net financial revenue (Item 9 minus 7 & 8)	<u>+574.25</u>	
11. Agric. development fund (8.5% of F.O.B. price)	254.86	
12. Price Maintenance Fund (5% of F.O.B. price)	<u>149.92</u>	
13. Surplus/Deficit (Item 10 minus 11 & 12)	<u>+169.47</u>	
14. Average economic revenue (before shadow pricing adjustment) (Item 9 minus 2-6)	<u>2,902.99</u>	<u>2,314.98</u>
15. Average economic revenue (after shadow pricing adjustment)		<u>2,324.96</u>

Source: RFI, Annex 12, Section 2, table 1.



 Existing Channels
 Proposed Channels

Figure 6-3. Marketing system for oil palm products in Sierra Leone, 1980.

Harvesting is labor intensive. No estimates of actual hours necessary for this work are available. Women and children do the harvesting.

The cash inputs are low. Seed is saved from preceeding crops. Presumably some seed could be imported. Chilli generally responds poorly to fertilizer. Pests can cause problems, but most practical approaches emphasize avoidance. Planting on raised beds could minimize root rot and avoiding planting chilli in association with or following tobacco, tomatoes, eggplant or potato could improve crop quality and yields.

The low production of chillies is reflected by the relatively high local price. The SLPMB reported that local chilli prices in 1978 were equivalent to Le 730 per ton while the world market price in Amsterdam was approximately Le 456.

The proposed export production strategy is to involve about 600 growers each cultivating 0.6 to 0.8 hectare of chillies under intensive management with expected total production to be 250 tons of dried fruit. The incentive would be high yield per hectare and a guaranteed sale to the SLPMB. While the total expected production for export is small it is sufficient for Sierra Leone to enter and test the world market. If the program is successful, a second phase would raise the production target to 500 tons. Prospects, however, do not appear bright. As the local farmgate price is above the world market price, it is unlikely that farmers would be willing to sell to SLPMB. (The proposed price is Le 1.00 per kg, much below the local price). If production is increased to the point where local prices are more in line with world prices, farmers are unlikely to continue growing the crop. Finally, the presence of virus in some plantings observed suggests the cultural package needs to be further developed to insure production. The real potential for chillies may exist in production as a cash crop for local sale. Although the contributions of calories to the diet is not significant, chillies are an important source of minerals and vitamins A and C.

6.2.8 Cash Crops: Ginger

Ginger is a small but profitable cash crop for farmers. Ginger formerly contributed significantly to export earnings but the quality and volume of exports have declined markedly in recent years. Some ginger development is proposed for the Magbosi IADP.

Ginger is produced in the Southern Province and in Kambia District, Northern Province, where the new production is proposed (Table 5-14). Most farmers (60 percent) grow ginger for one year and then allow the land to go fallow. Crops are planted with 560-780 kg/ha and are weeded at 2-5 months. Yields are 3.4-4.4 tons/ha of dried ginger.

The entire production is purchased by the SLPMB through its buying agents. At 1977 prices, the return to farmers is high (see Table 6-15). Unfortunately, poor quality has made international sale of the crop by the SLPMB almost impossible although they continue to purchase local output.

Table 6-14. Ginger purchases by SLPMB agents, 1977

Location	Quantity (mt)
Bo	427
Moyamba	27
Tarama	22
Freetown	34
Sereluma	1
Kambia	22
	<u>533</u>

Source: Corrected from SLPMB, Vol. 3, 1977, p.2.

Table 6-15. Returns and costs of ginger production, Sierra Leone

Item	Computation
Labor/ha	212 days
Average yield/revenue	3.7 tons @ Le1,008/ton = Le1,512
Average costs	<u>309</u>
Gross margin/ha	3,421
Revenue/day of labor	Le16.13

Source: Adapted from SLPMB, 1977, p. 17.

6.2.9 Food and Cash Crop: Oil Palm

Palm kernel is the main oil seed produced in Sierra Leone and palm oil is the major food oil used for domestic consumption. Increasing oil palm production continues to be a major goal of agricultural development in Sierra Leone.

Oil palm is grown as a cash crop and as a source of oil and wine for domestic consumption. The tree grows wild in the upland bush throughout the country. Approximately 8,000 ha are in improved varieties under plantation conditions, about 3,000 of which are in estates associated with palm oil processing plants. The Eastern IADP seeks to encourage oil palm plantations and the Gambia-Mattru and Daru palm oil mills contract with local farmers. Oil palm fruit is harvested year-round with peak periods between March to May and September to November.

For wild palms, women are responsible for the collection of fruit and the extraction of oil through a long process of boiling, skimming and pounding. In some areas of Sierra Leone, palm oil is an important source of extra income for women.

Table 6-16. Cost and returns from one acre oil palm development in Sierra Leone, 1980.

Cost Item	Year										Total
	1	2	3	4	5	6	7	8	9	10	
	----- (leones) -----										
Development Labor	90	18	18	16	--	--	--	--	--	--	
Maintenance and Harvesting Labor	--	--	--	--	38	40	48	44	40	40	
Planting Materials	138	29	31	25	--	--	--	--	--	--	
Maintenance Materials	--	--	--	--	33	33	33	33	33	33	
Total Cost	228	47	49	41	71	73	81	77	73	73	
Yield (mt)	--	--	--	--	1.5	2.0	2.5	3.0	3.5	3.5	
Gross Revenue ^a	--	--	--	--	60	80	100	120	140	140	
Net Return	(228)	(47)	(49)	(41)	(11)	7	19	43	67	67	-173.00 ^b

^aBased on sales of FFB to mills at Le 40/ton.

^bAt a day labor rate of Le .76 this becomes Le -94.48.

Source: EIADP-3, 1979, Budget labor calculations are based on 45 man-days of development labor and 19-24 man-days per year of maintenance/harvesting labor, costed at Le 2.00.

Accurate measures of annual fruit production do not exist. Oil production from wild palm has been estimated at 155,000 tons assuming a 20 percent yield. Plantation/mill operations produce approximately 14,000 tons of oil from 61,000 tons of fruit at a 23 percent yield.

Palm fruit bunches are heated at the processing plant to remove fruit. The heated fruit is pressed to remove oil. The oil contains a high percentage of water which is removed; the resulting red oil is packed in drums for storage and marketing. The free fatty acid content of the oil is too high to meet export standards; all is consumed domestically.

The remaining pulp and the nut are dried. The pulp is used for fuel; the nut is cracked to remove the kernel, which is sold to the SLPMB palm kernel oil mill in Freetown. Palm kernel, palm kernel oil and palm kernel cake (the residue left after oil is pressed from the kernel) all have export value; palm kernel cake is also used for poultry and swine feed. The SLPMB has plans to expand operations at the Freetown palm kernel mill.

The long and tedious traditional methods of palm oil processing are the joint responsibility of men and women.

Palm kernel is purchased by licensed SLPMB buying agents and exported directly or sold to the palm kernel oil mill. In the past, the mill has had difficulty obtaining raw material due to the high international prices being paid for palm kernel relative to the prices for oil.

6.3 FORESTRY SUB-SECTOR

6.3.1 Forestry Resources

The forest resources of Sierra Leone are used primarily for fuelwood. A small forest's products industry is a minor consumer of the total wood volume. Sierra Leone is a net wood importer.

The Forestry Division administers three types of lands: forest reserves, protected forests, and wildlife reserves and protection forests. Forest reserves and protected forests are available for commercial timber exploitation. The protected forests are almost all small in size (8-800 ha), many of them planted in strips along roads. The wildlife reserves and protection forests are administered for habitat and watershed protection purposes; no wood may be removed from them. Table 6-17 shows the areas administered under each type of forest.

Table 6-17. Lands administered by the forestry division

Administrative Unit	Area
	(hectares)
Forest Reserves	285,000
Protected Forests	32,000
Wildlife Reserves and Protection Forests	<u>76,650</u>
TOTAL	<u>393,650</u>

Source: Atlanta, 1979.

As noted in Chapter 2, a distinction is usually made between high forest and secondary forest. The closed high forest is estimated to cover 3,743 km², or 5.1 percent of the total land area. Secondary forest covers an area of 2,675 km², or an additional 3.6 percent of the land area. The main component of Sierra Leone's forest resources is natural hardwood forests, concentrated in the Eastern Province. Plantation forests represent only a small portion of the total forest resource. Characteristic of the hardwood forest is a large mix of some 200 individual tree species, only 60 of which have been commercially exploited. Production for export is limited to a small number of tropical redwood species.

Forest plantations were established in Sierra Leone as early as 1931. A wide variety of species have been planted, but the majority of these plantations consist of Gmelina and Terminalia. Table 6-18 presents a summary of forest plantation efforts in Sierra Leone. Recent efforts have focused on planting in the protected forests of the Southern Province. The total area planted is still a minor percentage of total forest land.

The plantation forests are generally established as part of an agro-silvicultural system in which tree and food crops are planted in the same area. The land can be used for crop production until the forest canopy closes and prevents the penetration of sunlight.

Current data on the volume of standing timber in Sierra Leone forests are not available. Based on existing inventories of forests and a current study of plantations, Atlanta has estimated standing volume as follows:

Natural Forests	3.52 million m ³
Plantations	.18 million m ³
Total	<u>3.70 million m³</u>

Table 6-18. Plantation areas in Sierra Leone.

Province	Planted before	Planted
	1971	1971-1977
	----- (hectares) -----	
Eastern	2,198	108
Northern	1,221	465
Western	365	138
Southern	<u>3,822</u>	<u>1,556</u>
TOTAL	7,604	2,267

Source: Atlanta Industrie-und Unternehmensberatung GmbH.,
Forest Resources Development in Sierra Leone, Hamburg,
June 1979.

6.3.2 Forest Utilization

Only a small percentage of the wood harvested each year in Sierra Leone is industrially processed. A FAO study in 1978 showed that 95 percent of all wood harvested is used for fuelwood (mostly firewood). A further four percent is used for construction by artisans. The remaining one percent is commercially processed into sawn timber or exported as logs.

Logging and wood processing is controlled by the Forestry Division. At present five companies have government concessions for commercial forest exploitation. These concessionaires employ approximately 1,100 workers, 60 percent of them in the mills. In 1978, the total volume harvested was estimated at 50,000 m³. Sawn timber production for the same year was 12,500 m³.

In addition to its domestic production, Sierra Leone imports sawn timber, plywood and fiberboard. The Central Statistics Office estimates 1978 imports at 1,000 m³ of sawn timber and 2,400 m³ of wood-based panels. The majority of the panel volume is plywood imported from Liberia. This enters Sierra Leone duty-free under the Mano River Union trade agreement.

Quantifiable data on the utilization of wood resources for fuelwood are not available. Wood consumption for fuel in 1976 was estimated at 2.5 million m³. The majority of this came from lands being cleared for agricultural production. In the Eastern Province, logging wastes also serve as a source of firewood. Only very limited quantities of charcoal are produced. Forestry Division personnel estimate that fuelwood supplies for the Freetown market are coming from as far away as 150 miles.

Although data are lacking on fuelwood consumption, consumer prices for firewood in Freetown are monitored by the Central Statistics Office. From 1973 to mid-1978, firewood prices in Freetown rose at an average rate of 27 percent per year. This is approximately twice the rate of the Freetown consumer price index over the same time period. The major component of the price of firewood in the urban centers is transport cost. The recent (March 1980) 50 percent increase in the cost of gasoline indicates further price increases for fuelwood for urban consumers.

6.4 THE LIVESTOCK SUB-SECTORS¹

The major livestock in Sierra Leone are cattle, sheep, and goats. Swine and poultry are of relatively minor importance. A 1979 aerial census estimated cattle at 333,181 head, sheep at 244,010 and goats at 134,062. Pig and poultry estimates vary widely. The 1979 Hunting study estimates were 15,000 for pigs and 1.7 to 3.4 million for poultry. Overall, the contribution of livestock to the economy is small, representing five percent of the total contributions of agriculture and 1.6 percent of the GDP (CSO, 1979).

6.4.1 Cattle

Except for a few head at the Teko Livestock Station, all cattle in Sierra Leone are of the N'Dama breed, a small, short-legged animal that is tolerant of trypanosomiasis. Over 80 percent are in the Northern Province; their owners belong to the Fullah tribe of traditional pastoralists. The Fullah manage their cattle to maximize numbers; their opportunistic approach to grazing requires moving their cattle from place

¹ Except where noted, data for the livestock sub-sectors are taken from the *Sierra Leone Livestock Development Study*, Herts, England: Hunting Technical Services Ltd. 1979, Vols. 1 and 2. This is the most recent and most thorough study of livestock in Sierra Leone available.

Table 6-19. Origin and destination of trade cattle, Sierra Leone

	Origin and Destination				Total
	Koinadugu via Kabala	Kamakwie via Bombali	Kambi via Port Loko	Kono Koinadugu via Worodu	
			(numbers)		
Northern Province	1,750	160	---	---	1,910
Southern Province	7,500	720	350	----	8,570
Eastern Province	7,500	1,760	100	14,100	24,060
Western Area	6,250	5,200	1,750	----	13,200
Others	<u>2,000</u>	<u>160</u>	<u>700</u>	<u>900</u>	<u>3,760</u>
TOTAL	25,000	8,000	3,500	15,000	51,500
			(percent of total)		
Northern Province	3.4	0.3	---	---	3.7
Southern Province	14.6	1.4	0.7	---	16.6
Eastern Province	14.6	3.4	1.4	27.4	46.7
Western Area	12.1	10.1	3.4	----	25.6
Others	<u>3.9</u>	<u>0.3</u>	<u>1.4</u>	<u>1.7</u>	<u>7.3</u>
TOTAL	48.5	15.5	6.8	29.1	100.0

Source: Hunting Technical Services, 1979, p. 100.

to place and brings clashes with crop farmers. No fodders or supplemental grains are fed to the cattle. Opinions differ as to whether the Fullahs are becoming more commercially oriented. Traditional cattle management practices resist change even though improved practices are known.

Herd composition is estimated at 35 percent breeding cows, 50 percent immature animals (up to four years of age), and 15 percent mature bulls and steers. Average mortality for the whole herd is 15 percent with the highest mortality in calves up to one year of age -- probably 45 percent. Calves are born to about 65 percent of the breeding cows each year, with a calving interval of 18 months. Cows first calve at four years and are productive for 12 years. Offtake is estimated at seven percent, comprised of steers, bulls, and cull cows.

Cattle slaughter was estimated at 47,000 head in 1978. A seven percent offtake would contribute about 23,000 head from Sierra Leone herds; the remainder are brought in from neighbouring Guinea. Although officially illegal, the Guinean authorities do not take measures to control the border movements and it is estimated that 50,000 to 60,000 head are brought in each year. Up to half are slaughtered for meat; the remainder are added to herds in Sierra Leone or are taken to Liberia for sale there at higher prices. It is estimated that 9,000 head were exported to Liberia in 1980. The Koinadugu District is the most important trading area. Estimates are that 60 percent of the cattle come through the five border marketing centers at Gbentu, Gbendu, Gberia Folombu, Karifya, and Masadugu. The Eastern Province is the destination for nearly half the cattle; Freetown receives about one-fourth, all for slaughter (Table 6-19).

Road transport is the major method for moving livestock within Sierra Leone. A standard truck holds between 15 and 17 head. The cost of trucking is estimated at Le 0.80 per kilometer but varies considerably depending on the season and on whether the road is tarred. Transport is by private operators, some of whom have close ties with producers, traders and butchers. Cattle from the Kabala area in the north must pass a number of animal health inspection stations to reach Freetown. These stops add to transport costs as payments are made to facilitate movement. Trucking costs to operators are estimated at about Le 0.50 per kilometer, which suggests a reasonable profit margin.

The procedure for slaughter and distribution of meat is uniform throughout Sierra Leone. Each of the main urban centers has facilities for slaughtering livestock and market stalls are provided by the local municipality. Fees for the slaughter facility and market stalls are low: in Freetown, Le 2.60 per animal. Newer facilities being constructed will increase the fees.

Wholesale and retail butcher margins are estimated to take slightly more than one third of the retail value. The cost linkage for an average animal from the Koinadugu market sold at retail in Freetown is:

For a 181 kg liveweight animal

	<u>Per animal</u>	<u>Liveweight cost per kg</u>	<u>Percent of retail price</u>
(Leones)			
At Gbindi Market	161.00	.88	56
Transport to Freetown	13.25	.07	4
Slaughter fee and handling	12.00	.07	4
Wholesale and retail margin	<u>102.75</u>	<u>.57</u>	<u>36</u>
Retail price	288.00	1.59	100

These numbers suggest that butchers are receiving high profit margins. However, hidden costs such as grazing fees, fodder, meat spoilage, and facilitating payments are not included. The landed liveweight cost at Freetown of about Le 1.00 per kilogram confirms the price offered by butchers on a liveweight basis at the slaughterhouse. Retail markups at other urban centers are not much different.

The value in Freetown at the central market for an animal weighing 180 kg is Le 286.60. This animal will yield 136.8 kg of saleable products (76 percent of liveweight). The carcass is 46.9 percent of liveweight and parts (tongue, heart, liver, hide, kidneys, spleen, lungs, diaphragm, gastrointestinal tract, feet, tail and head) constitute the remaining 29.1 percent. The tail brings the highest retail price per kilogram, the head the least. The 1975-77 FAO Food Balance Sheet shows a supply of 5,000 metric tons of meat available for consumption or an average consumption of 1.9 kg per capita providing an average daily intake of 10 calories and 0.8 grams of protein. This represents a contribution of 0.5 percent of calories and 1.6 percent of total protein. These estimates are considerably higher than those of the Hunting Technical Services study (Table 6-20).

In 1977, estimates of meat imports included 28.6 tons of chilled fresh and frozen meat, 195.3 tons of dried, salted and fresh meat, and 136.3 tons of canned meats and preparations. The total 360 tons when added to local supplies still do not bring the two estimates close together. During the 1970's total meat consumption did not increase and probably declined.

6.4.2 Sheep

Sheep numbers and trade are more difficult to estimate as not all sheep traders are issued permits and there is a greater internal offtake that does not enter into trade statistics. It is estimated that in 1978 40-50 percent of the recorded trade in sheep originated in Guinea, or about 10,000 in number. The sheep average about 25 kg in weight and bring a price of Le 1.20 per kg. Sheep are also exported to Liberia but no estimates are available.

Sheep in Sierra Leone are of the Djallonke breed. They are thin tailed, relatively long-legged and generally black and white. An FAO study in 1971 reported the age of first lambing as 15-18 months with a prolificacy rate of 191 percent with two lambings per year. This indicates high potential fertility, but there was also a high mortality rate among lambs, ranging

from 16 to 67 percent depending on the year. Average weight at six months was 8.6 kg. Unlike cattle, sheep are common throughout Sierra Leone. In most parts of the country, they are scavengers in villages and urban areas. Sheep suffer internal parasites and foot infections. They are trypano-tolerant like the N'Dama cattle.

In January 1979, sheep were selling for Le 1.75 per kg liveweight with some price premium over goats. Price increases as one moves south and into the urban areas, reflecting transport costs. For 1979, estimates were that a total of 48,800 head were slaughtered at an average liveweight of 25 kg per head, yielding 670 tons of meat. The FAO Food Balance Sheet for 1975-77 shows 14,000 head produced plus 42,000 head imported, yielding 1,000 tons of meat. This would contribute per capita amounts of one calorie and 0.1 grams of protein per day.

6.4.3 Goats

Goat trade is difficult to estimate for similar reasons. The estimate of goats traded in 1978 was 15,000 head, selling for Le 1.75 per kg of liveweight. Total slaughter was estimated at 33,500 head in 1979. With an average liveweight of 20 kg and 55 percent carcass weight, total goat meat production was 368 tons. This suggests goat meat consumption is 55 percent of mutton (Table 6-20).

Goats in Sierra Leone are a typical dwarf variety with short legs, a lively disposition and wide color variations. Also trypano-tolerant, goats have fewer foot problems than sheep and are equally adept scavengers. They hold considerable potential for increasing meat supplies to farmers.

6.4.4 Pigs

Pigs are relatively unimportant in Sierra Leone. In the urban areas, there are some commercial piggeries but pigs are not found in Moslem communities, which predominate in many rural areas. Estimates for 1979 indicate only 7,500 head slaughtered, yielding 375 tons of pork meat -- down considerably from 1970. FAO estimates are higher, showing 1,000 tons of available supply for 1975-77.

As a non-ruminant animal, pigs must be fed grain concentrates to grow efficiently. The small piggeries in the Western area confine the animals and use grain feed mixes prepared by feed mills. Local ingredients include maize, rice bran, oyster shell, sorghum and dried fish. Concentrate and pre-mixes are imported.

There is a pig and poultry processing plant located near the Kissy Dockyard in Freetown. Local producers are contracted to supply pigs at a carcass weight price of Le 1.75 per kg. Ten percent of the meat is used for sausages and 90 percent is made into bacon, ham, and pork. The slaughter facility charges Le 2.50 per pig.

The NIADP has a piggery component in their livestock development plan. They hope to establish a small number of selected farmers with satellite piggery units.

Table 6-20. Estimated cattle, sheep, goat, pig, and poultry meat production, 1970^a and 1979^b

	Proportion of population slaughtered (percent)	Number slaughtered (number)	Average liveweight (kilograms)	Percent of carcass and offal (percent)	Meat per carcass (kilogram)	Total meat production (tons)
Cattle						
1970	8	20,000	204	75	153.0	3,060
1979	7	23,100	180	70	126.0	2,910
Sheep						
1970	20	11,400	25	70	17.5	199
1979	20	48,800	25	55	13.8	670
Goats						
1970	20	39,000	23	70	16.1	628
1979	25	33,500	20	55	11.0	368
Pigs						
1970	75	21,750	68	85	58.0	1,261
1979	50	7,500	---	--	50.0	375
Poultry						
1970	150	4,350,000	1	70	0.7	3,045
1979		4,300,000	---	--	0.7	3,000

^aFAO estimates.

^bFrom Hunting Technical Services, 1979, p. 29.

6.4.5 Poultry

Poultry are found throughout Sierra Leone in both rural and urban areas. Only in urban areas can commercial poultry units be found. Estimates of numbers are 4-5 million slaughtered annually, producing an offtake of about 3,000 metric tons. The commercial industry is dependent on imported chicks and processed feeds. There is no apparent shortage of either eggs or meat, but prices are high -- eggs Le 2.20 per dozen retail. The producer is paid about Le 1.60 per dozen for eggs and Le 3.30 per kg for dressed broilers. Poultry is also slaughtered at the Kissy plant for fees of Le 0.08 per bird. FAO estimates (for 1975-77 average) that the available supply is 3,000 tons of poultry meat and 2,000 tons of eggs. On a per capita basis poultry would thus supply only five calories and 0.5 grams of protein per day. FAO also estimates that an additional 2,000 tons of game meat from birds is consumed.

6.5 INLAND FISHERIES SUBSECTOR

Fish are the principal complete protein source for the majority of Sierra Leoneans. FAO estimates for 1975-77 indicate a per capita supply of 18.9 kilograms providing 48.0 calories and 8.1 grams of protein per day. Of this amount, perhaps two percent came from inland fisheries. Regional consumption varies widely. The per capita consumption in the Northern Province is only half the average for the rest of the country. The availability of fish decreases as distances from improved roads increases. Fish in upland markets are limited, for the most part, to dried bonga, a small salt-water fish taken in large quantities from the mouths of the main rivers along the coast.

In recent years, there has been renewed interest in fish ponds for inland farmers. MNR fisheries personnel have opened a Fish Station at Makali and are providing fingerlings to a small group of local farmers. They hope to provide both a continuing source of complete protein and a source of supplementary income to farm households. Peace Corps Volunteers are assisting MNR personnel as extension educators to rural farmers. The only species being used presently is Tilapia Nilotica, a rapidly-growing and prolific species common throughout the tropics. They are omnivorous, eating, among other things, larvae of the malaria-carrying mosquito. They are also disease resistant and can tolerate oxygen deficiencies better than other species.

Farmers are encouraged to build ponds of approximately 100-200 square meters or, preferably, to convert existing rice paddies. Fingerlings are stocked at one or two per square meter and a six month growing season is scheduled.¹ The fish are fed rice bran and termites, both of which are available at nearly zero cost to most farmers. At the end of six months, the pond is harvested and cleaned. The fingerlings should have grown to an average of 16-18 centimeters, weighing about 0.25 kg. Since Tilapia reach reproductive maturity at three months of age, at harvest the pond contains a number of small fish and fingerlings. The larger fingerlings

¹ Presently, the Makali Fish Station is selling fingerlings to the farmer for one cent each.

are used as base stock for another six month production cycle. This production system can be continued without any outside capital inputs after the initial cycle. Thus, it is particularly amenable to isolated rural areas where fish are scarce.

CHAPTER 7

AGRICULTURAL ASSESSMENTS

The preceding chapter described the more important commodity sub-sectors in the agriculture of Sierra Leone. This chapter assesses the current situation regarding these commodities, using quantitative and judgement analysis and addressing key questions and problem areas from social, economic, and institutional perspectives.

7.1 ECONOMIC ASSESSMENTS7.1.1 Private and Social Profitability of Rice in Sierra Leone

Spencer (1979) uses profitability analysis of various rice production systems to build a convincing case for the development of swamp rice in Sierra Leone. His analysis is based on 1976 cost figures. Since that time, labor rates and rice prices have changed markedly. A re-analysis of Spencer's work in light of these changes was made, primarily to illustrate the impact of labor on the profitability of swamp development as it has commonly been presented.¹

Using figures for labor input based on a 1974-75 study (Spencer and Byerlee, 1977), the development cost for inland swamps is calculated using 47 and 60 days of labor for traditional swamps in the south and north respectively. For improved swamp, the labor requirement is estimated at 185 days. A Le 172.90/ha development loan at the subsidized rate of eight percent for five years is included in the development costs for improved swamp. No land development costs are identified for other techniques. All other labor is included as farm labor on an annual basis. Both development and farm labor are costed at a prevailing daily wage rate estimated to be between Le1.80 and Le2.50, with Le 2.00 the most common. The annual rental value of land used by Spencer was increased slightly in all categories to reflect 1980 operating practice.

The cost of seed and fertilizer was based on Spencer's estimates for all techniques except improved swamp, where IADP practice was followed. Spencer's figures were adjusted on the basis of their relationship to IADP practice. Annual tool costs were estimates based on operating experience. Interest was calculated on loans for fertilizer, seed and tools at 10 percent in improved areas and 40 percent in traditional areas.

Summing all costs incurred on an annual basis provides an estimate of the cost per hectare. A more meaningful figure can be obtained using yield data to determine the cost per ton of rice produced. Values of yield reported by Spencer (1979) used in this calculation are shown in Table 7-1.

¹ *It is important to note that all yield figures are based on a single monocrop of rice. Inter cropping is common in upland farming and double crops are possible on some inland swamps. This is discussed in more detail below.*

Table 7-1. Paddy rice yield for selected Sierra Leone production systems

Production system	Yield tons/ha
Traditional Upland	
South	1.170
North	.810
Improved Upland	
South	1.872
North	1.458
Mangrove Swamp	
South	1.736
North	2.803
Bolilands	
Manual	.963
Mechanical	1.132
Riverain	1.820
Traditional Inland Swamp	
South	2.334
North	2.142
Improved Inland Swamp	
South	3.034
North	2.785

Source: Spencer 1979, p. 32

The government guaranteed farmgate price for rice in 1980 was Le 7.50 per bushel. The actual price received by farmers may vary over the course of the year, being lower at harvest and higher later. Using this price, at 37 bushels per ton, the farmer should receive Le 277.50 per ton. The difference between this and his cost is profit or loss.

Assuming a 67 percent yield of clean rice the stated farm price translates to a farmgate value for milled rice of Le 414.18. Since yields appear to range between 62 and 70 percent, with 67 percent commonly quoted, this value is used in the profit analysis.

Spencer cites a marketing cost per ton of clean rice at between 48.53 and 65.11 Leones per ton. The lowest of his values is used in this analysis. The data in Table 6-9 indicate costs of Le 47.36 per ton for bagging, transport and storage which are consistent with this assumption. Increasing wage rates and fuel costs will significantly increase this component, further reducing social profit.

Values of government subsidy have not changed significantly since 1976. The values reported by Spencer (1979) are used in this analysis. The domestic cost basis is calculated using the posted farmgate price, adjusted for milling yields and adding marketing costs and subsidies, if any.

The shadow price of rice production is the price of wholesale imported rice, currently CIF priced at Le 365 per metric ton of milled rice. If handling charges are added, as was done in Spencer (1979), this becomes Le 374.

Costs and returns for rice and the resulting private and social profitability of each system for 1980 are summarized in Table 7-2. Table 7-3 shows the relative impact on farmers. It is evident from this analysis that the profitability of rice production is not as clear a benefit today as it was when Spencer conducted his analysis; all production systems are now socially unprofitable and over half are privately unprofitable as well. Social profitability as measured by the price of imported rice is negative for all forms of production, since the farmgate price plus marketing cost exceeds the delivered price of imported rice.

The resource cost ratio indicates the relationship between world price and domestic costs for farmers. When this value is greater than 1.0, as it is for all but one production system, the total product cost of production in Sierra Leone exceeds the cost of importing rice. Until the CIF price of imported rice reaches Le 454 per ton, it will not be socially profitable to purchase grain from farmers at Le 277.50 per ton, as imported rice is cheaper. At the current price of Le 374 per ton, a farmgate price of Le 5.89 per bushel is appropriate, yielding Le 218 per ton paddy. There is only one area, riverain grasslands, in which Sierra Leone maintains a comparative advantage in rice production.

By costing farm labor at prevailing wage rates, it becomes apparent that the return to the farmer from rice cultivation is not attractive, except in those areas where subsidized mechanical cultivation reduces the labor component. As hired labor costs increase, the farmer is forced to work at an increasingly reduced return to his labor.

Costs, returns, and profitability for rice production systems in Sierra Leone based on a wage rate of Le 2.00 per day*

Rice Production system	Land Cost		Labor Cost			Fertilizer Cost	Seed Cost	Annual Tool Cost	Working Capital Interest	Total Costs per ha	Total Costs	Private Profit (Loss)	Market-ing Cost	Sub-sidy	Domestic Cost Basis	Social Profit (Loss)	Total Product	Resou- rce Cost Ratio
	Development	Rental	Days	Daily Wage	Total													
	(leones)		(days)	(leones)		(leones per ton of paddy rice)						(leones per ton of milled rice)						
Traditional upland-south	-	4.00	205	2.00	410.00	-	15.1	6.00	8.76	444.67	380.06	(102.56)	48.53	-	462.71	(88.71)	615.78	1.64
Traditional upland-north	-	4.00	238	2.00	476.00	-	16.18	6.00	8.87	511.05	630.93	(353.43)	48.53	-	462.71	(88.71)	990.22	2.65
Improved upland-south	-	4.00	225	2.00	450.00	20.90	24.77	6.00	5.16	510.83	272.88	4.62	48.53	36.06	499.31	(125.31)	491.87	1.31
Improved upland-north	-	4.00	258	2.00	516.00	20.90	24.77	6.00	5.16	576.83	395.63	(118.13)	48.53	46.30	509.01	(135.01)	685.32	1.83
Mangrove swamp-south	-	7.00	220	2.00	440.00	-	27.10	4.00	3.11	481.21	277.19	0.31	48.53	-	462.71	(88.71)	462.25	1.24
Mangrove swamp-north	-	21.00	445	2.50	1112.00	-	38.14	7.20	4.54	1182.88	422.00	(144.50)	48.53	-	462.71	(88.71)	678.38	1.81
Boliland manual cult.	-	2.00	112	2.00	224.00	1.94	21.79	6.00	2.97	258.70	268.64	8.86	48.53	6.10	468.81	(94.81)	455.59	1.22
Boliland mech. cult.	-	6.00	68	1.80	112.40	2.90	18.67	3.50	2.51	180.68	159.91	117.89	48.53	117.00	579.71	(205.71)	403.75	1.08
Riverain	-	5.00	91	2.00	122.00	-	14.13	6.00	2.01	233.84	128.48	149.02	48.53	68.00	530.71	(156.71)	308.29	.82
Traditional inland-south	38.95	14.00	274	2.00	548.00	-	16.50	6.00	9.00	632.45	270.97	6.53	48.53	-	462.71	(88.71)	452.96	1.21
Traditional inland-north	49.72	15.00	356	2.00	712.00	1.86	32.65	7.50	16.06	834.79	389.72	(112.22)	48.53	2.64	465.35	(91.35)	632.84	1.69
Improved inland-south	103.31	15.00	336	2.00	672.00	22.23	29.64	10.00	6.19	858.37	282.92	(5.42)	48.53	48.73	511.44	(137.44)	519.53	1.39
Improved inland-north	103.31	16.00	390	2.00	780.00	22.23	29.64	10.60	6.25	968.03	347.59	(70.09)	48.53	51.48	514.19	(140.19)	618.80	1.65

* Assumptions: Farm gate rice price of Le 277.50 per ton of paddy (equal to Le 414.18 per ton of milled rice), and import price of Le 374.00 per ton of milled rice. Also see Spencer (1979a) for cost assumptions other than labor.

Table 7-3. Private and social profitability of various rice production systems, Sierra Leone, estimates for 1980

Rice Production System	Net Private Profit		Net Social Profit		Social Protection ^c Le/ton
	Le/ton	Ranking ^a	Le/ton	Ranking ^b	
Traditional Upland					
South	-153.07	9	-88.71	1	-64.36
North	-527.61	13	-88.71	1	-438.80
Improved Upland					
South	+6.90	5	-125.31	8	+132.21
North	-176.31	11	-135.01	9	-41.30
Mangrove Swamp					
South	+0.46	6	-88.71	1	+89.17
North	-215.67	12	-88.71	1	-126.76
Boliland					
Manual Cultivation	+13.22	3	-94.81	7	-108.03
Tractor Plowing	+175.96	2	-205.71	13	+381.67
Riverain	+222.42	1	-156.71	12	+379.13
Traditional Inland Swamp					
South	+9.75	4	-88.71	1	+98.46
North	-167.49	10	-91.35	6	-76.14
Improved Inland Swamp					
South	-7.82	7	-137.44	10	-129.62
North	-104.19	11	-140.19	11	+35.58

^aFrom table 7-2 adjusted for 67 percent milling yield.

^bFrom table 7-2.

^cNet private profit less net social profit.

Table 7-4. Calculation of family farm wage rates based on labor input and profit from rice operations, Sierra Leone, 1980 estimates

Rice Production System	Family labor input ^a (days of labor)	50% of farm labor cost ^b (Le/ha)	Profit on operations ^c (Le/ha)	Effective family wage rate ^d (Le/ha)
Traditional Upland				
South	102.5	205.00	-120.00	.83
North	119.0	238.00	-286.28	-.41
Improved Upland				
South	112.5	225.00	+8.65	.8
North	129.0	258.00	-172.23	.
Mangrove Swamp				
South	110.0	220.00	+ .54	2.00
North	222.5	556.00	-405.03	.68
Bolilands				
Manual	56.0	112.00	+8.53	2.15
Mechanical	34.0	61.20	+133.45	5.73
Riverain	45.5	91.00	+271.22	7.96
Traditional Inland Swamp				
South	137.0	279.00	+15.24	2.15
North	178.0	356.00	-240.38	.65
Improved Inland Swamp				
South	168.0	336.00	-16.44	1.90
North	195.0	390.00	-195.20	1.00

^aAssumes 50 percent of direct farm labor and all development labor is hired at the prevailing wage rate.

^bValue of hired labor at the prevailing wage rate.

^cBased on profit (loss) per ton of paddy produced adjusted for yield per hectare.

^d(Value of family labor + profit from operations)/labor input.

If it is assumed that 50 percent of farm labor is hired labor (EIADP, 1979), and that all development labor is hired, the effective family wage rates in the various areas can be calculated. These values are shown in Table 7-4. Improvements in the traditional systems appear to pay off for the individual farmer, while increasing the social cost due to subsidy (Table 7-5). In the absence of subsidy, however, farmer gains are still considerable. In the inland swamp, the results are mixed. Development reduces the production cost of rice, but reduces the value of farm labor in the north while increasing it in the south. The social cost is increased through subsidy when inland swamp is improved. In the absence of subsidy, development of inland swamp is not currently profitable for any farmers. Development policies should, of course, not be based solely on this type of analysis. The role of additional crops produced in conjunction with rice and the social issues involved in rice cultivation must also be considered. Some of these issues are discussed below.

7.1.2 Sensitivity Analysis

Except for the boliland and riverain mechanical rice production systems, labor cost is over 80 percent of total private production cost. As a result, changes in the labor rate per day of labor impacts heavily on profitability (see sensitivity analysis results in Table 7-6). The impact is greatest in the mangrove swamp and the improved inland swamps in the north.

Table 7-5. Differences in effective farm family returns under improved and traditional rice cultivation techniques in Sierra Leone, 1980 estimates^a

	Subsidized difference	Unsubsidized difference
	(Le/day)	(Le/day)
Upland		
South	1.25	.65
North	1.07	.55
Inland Swamp		
South	-.25	-1.13
North	.35	.03

^aCalculated assuming farmers paid full cost of subsidized materials and services.

In a portion of the swamp areas (wide ranges in percentage were suggested) it is possible to obtain two crops of rice per year. To calculate the profitability of double cropping, it is necessary to reallocate certain costs. Land costs would not change. Labor required for crop production doubles, as do fertilizer and seed costs. For the improved inland swamp production system, double cropping reduces the loss in the north from Le 70.09 to Le 45.64 per ton of milled rice. In the south, double cropping would result in a profit of Le 16.75 per ton of milled rice compared to

Table 7-6. Sensitivity of private profitability for rice production systems to a change in the assumed labor wage rate from Le 1.75 to Le 2.00 per day

Rice Production System	Private profit or (loss): one crop		Sensitivity coefficient ^a
	wage @ Le 1.75	wage @ Le 2.00	
	(leones)		
Traditional upland			
South	(58.76)	(102.56)	-5.22
North	(279.97)	(353.43)	-1.84
Improved upland			
South	34.67	4.62	-6.07
North	(75.09)	(118.13)	-4.01
Mangrove swamp			
South	31.99	0.31	-6.93
North	(25.61)	(144.50)	-39.51
Boliland			
Manual	37.94	8.86	-5.37
Mechanical	120.89	117.89	0.17
Riverain	161.52	149.02	-0.54
Traditional inland swamp			
South	37.97	6.53	-5.80
North	(67.77)	(112.22)	-4.59
Improved inland swamp			
South	28.94	(5.42) ^b	-8.31
North	(28.79)	(70.09) ^c	-17.05

^aChange in profit associated with a one percent increase in the labor rate.

^bFor a double crop of rice, the private profit would be Le 16.75.

^cFor a double crop of rice, the private loss would be Le 45.64.

a loss of Le 5.42 for a single crop (Table 7-6). If labor costs can be significantly reduced for a second crop, the profitability can be increased substantially. Similarly, the effective cost of production in all areas can be reduced through intercropping. However, data is insufficient to calculate these effects.

7.1.3 Rice Development Strategies

Increasing rice output has been a major goal of agricultural development in Sierra Leone, promoted through the development of additional rice growing areas and the improvement of farming practices in existing areas. A major effort has been directed at development of inland swamps, due to the high potential yields. More recently, there has been increased emphasis on improving traditional upland cultivation practices.

The efficiency of rice production in Sierra Leone depends almost entirely on the availability and cost of labor. At a prevailing wage rate of Le 2.00 per day, the cost of producing rice is greater than the proposed farmgate price of Le 277.50 per ton of paddy. At the same time, current CIF prices for imported rice make it socially unprofitable to substitute domestic rice for imports. As a consequence, neither the farmer nor the consumer has any incentive to increase domestic production. It is not surprising that imports are increasing and farmers are increasingly reluctant to produce rice for market.

From a development perspective, however, the issue of whether or not to continue development of inland swamps, particularly if it is done in lieu of improvements in upland methods, must be examined.

Increased wage rates have raised the cost of swamp development significantly. When swamp is developed, a significant investment is made in terms of labor inputs. This cost has increasingly not been covered by development subsidy and loan programs. At the same time, the invested value in already-developed swamp has increased due to the high labor component of new swamp development. In some areas, this has led to the reallocation of swamp land rights at a substantial loss to the farmer who made the initial investment in swamp development. Although the yields from inland swamp may be as much as three times those produced by traditional upland methods, the return to the farmer for his labor is usually less than the mandated minimum wage (Table 7-7). In the south, cultivation using improved upland techniques provides a higher return to the farmer than farming the inland swamps. If a swamp farmer is forced to hire day labor at Le 2.00 per day, his return is further reduced since the return per day is less than the prevailing wage rate in many areas. The fact that many farmers are abandoning the swamps and defaulting on development loans is further evidence of the economic and social problems associated with swamp development.

Improved cultivation practices can increase yields from uplands significantly, and are particularly attractive when the improved techniques require only slight increases in labor. Since most current rice cultivation is upland, there is some rationale for emphasizing improvements in this area.

Table 7-7. Farmers returns per hectare from rice production at farmgate price of Le 277.50 per ton of paddy, Sierra Leone

Cultivation method	Labor required (days)	Cost of inputs -----	Total return (leones)	Return/Day of labor -----
Traditional Upland				
South	205	34.67	290.00	1.41
North	238	35.05	189.72	0.80
Improved Upland				
South	225	60.83	458.65	2.04
North	258	60.83	343.77	1.33
Improved Swamp				
South	336	186.37	657.05	1.96
North	390	188.03	584.80	1.50

Upland yields can also be increased significantly through weeding and row sowing, which require additional labor but no capital or foreign exchange expenditures. Alternatively, yields can be increased through fertilizer and chemical weed control when labor is difficult to obtain.

Little information is available on the production of mixed crops and second crops. Since cassava and sweet potatoes contribute significantly to the rural diet, attempting to increase production of these crops or alternative cash crops such as groundnuts seems to be a viable option when rice production is not possible. Mixed or intercropping seems to be more appropriate in upland areas, while second crops may be more suited to swamp areas where there is greater available moisture.

Mangrove swamp development is very labor intensive and may be environmentally harmful. The return per day of labor does not seem to justify continued mangrove swamp development. Mechanical cultivation in the bolilands and riverain areas produces significant rice yields at low cost. These are the most productive areas in Sierra Leone from an economic perspective.

7.1.4 Private and Social Profitability of Cash Crops

Cocoa. Tables 7-8 and 7-9 show the cost and returns to cocoa rehabilitation and new cocoa plantings. The average economic return is the projected world market price in 1978 constant values (RTI, 1978). Use of constant values assesses the profitability of these activities with respect to their real impact on farmers and Sierra Leone, relative to the current economic structure. This also allows a consideration of the social profitability of the projects apart from the distortions associated with nominal prices.

Returns to a cocoa rehabilitation program do not appear to be financially profitable over the ten year time period considered by this analysis. Farmers would continue to receive a net positive income from a cocoa stand which has been rehabilitated, but output gains from rehabilitation are offset by the inferior quality of existing cocoa stands, increased costs, and declining world market prices. New cocoa plantings represent a more complex situation. A new cocoa planting is not financially profitable over the ten years considered by this analysis. However, the project would break even after just one more year (Table 7-8).

Since the cocoa produced in Sierra Leone is strictly for export, the cocoa subsector interacts with the domestic economy only through the labor and purchased inputs market, the tax revenue generated for the GOSL by cocoa sales, and the multiplier effect of consumption generated by the revenue earned by cocoa producers and marketing middlemen.

With the projected decline in world market prices for cocoa, cocoa rehabilitation programs should be analyzed to identify the best ways to increase production while minimizing the cost of additional inputs. This would require research/extension efforts not currently underway. New cocoa planting must be viewed in terms of GOSL/SLPMB willingness to subsidize new plantings during the initial development phases.

The need for tax revenues and foreign exchange and the potential profitability of at least one of the alternatives for cocoa (i.e. coffee) suggest that the GOSL should re-evaluate the potential for development in the cocoa sub-sector. Potential fluctuations in cocoa prices are large enough that Sierra Leone's monetary and fiscal policy should not become overly dependent upon tax revenues and foreign exchange earnings derived from cocoa sales.

Coffee. Tables 7-10 and 7-11 show the costs and returns to coffee rehabilitation and new coffee plantings. The average economic return is the projected world market price in 1978 constant values (RTI, 1978). The use of constant values has the same advantage cited above for cocoa.

Both coffee rehabilitation and new coffee plantings are financially and economically profitable in the time period used for this analysis. Coffee rehabilitation results in an economic loss to the producer for the first two years as production declines after pruning.

By year three, however, increased output results in positive economic returns and the producer starts to recover his short run loss. From then on, net returns exceed net costs and are greater every year thereafter. New coffee planting results in a negative cash flow for the first five years of the ten year period, but by the end of year seven the producer has recovered all costs and can expect a profit for the remainder of the period. However, a new planting program would require access to credit under a deferred repayment schedule. Given the subsistence orientation of the average farmer in Sierra Leone and the protracted planning and time horizon (which most probably accompanies this subsistence environment) it is not likely that the farmer will invest in new coffee planting in the absence of subsidies.

Table 7-8. Estimated returns to ten year cocoa rehabilitation program for five acres with a one acre per year rotation in eastern Sierra Leone (price of cocoa in 1978 constant terms)

Time Period	0	1	2	3	4	5	6	7	8	9	10
Production (pounds per acre)	1250	1350	1500	1650	1800	1950	2000	2000	2000	2000	2000
Costs (Leones)											
Labor	96.25	117.25	136.50	161.00	185.50	210.00	215.50	218.75	218.75	218.75	218.75
Physical Inputs	5.00	52.00	104.00	156.00	208.00	260.00	260.00	260.00	260.00	260.00	260.00
Processing and marketing	16.37	17.68	19.64	21.61	23.57	25.54	26.19	26.19	26.19	26.19	26.19
Land RTI A12, 10A	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Other	<u>33.50</u>	<u>33.50</u>	<u>37.00</u>	<u>38.00</u>	<u>37.00</u>	<u>39.00</u>	<u>37.00</u>	<u>37.00</u>	<u>37.00</u>	<u>41.50</u>	<u>38.00</u>
Total	161.12	230.43	307.14	386.68	464.07	554.54	546.69	546.69	546.69	546.69	546.69
Average Economic Return (Le/Ton)	1,210.86	1,112.80	1,014.74	916.68	818.62	720.56	720.56	720.56	720.56	720.56	720.56
Total Economic Revenues	-	50.58	115.31	116.67	204.66	229.72	245.65	245.65	245.67	245.65	245.65
Net Cash Flow due to project	-	-18.73	-30.71	-58.82	-98.29	-154.15	-139.92	-139.92	-139.92	-139.92	-139.92
Total Return	687.99	682.85	691.86	687.51	669.78	638.68	655.05	655.05	655.05	655.05	655.05
Net Return	526.87	452.42	384.72	300.90	205.71	91.14	108.36	108.36	108.36	108.36	108.36
Net Return on 5 Acre Unrehabilitated	526.87	471.15	415.43	359.72	304.01	278.29	298.29	298.29	298.29	298.29	298.29

Source: Derived from RTI estimates of input costs and assuming a constant cost of Le 2.00 per day for labor.

Table 7-9. Estimated ten year return to a five acre new cocoa planting with a one acre per year planting and rotation program in eastern Sierra Leone (price of cocoa projected in 1978 constant value)

Time Period	1	2	3	4	5	6	7	8	9	10
Production (pounds per acre)	0	0	0	250	750	1550	2450	3350	4000	4400
Cost (Leones)										
Labor	141.75	197.75	245.00	292.60	328.30	237.33	237.13	245.18	252.88	272.48
Physical inputs	145.44	180.66	254.50	307.05	383.46	306.70	341.02	353.91	353.91	353.91
Processing & Marketing	0.00	0.00	0.00	6.42	19.27	39.73	62.71	85.70	102.20	112.40
Land	1.97	3.94	5.88	7.82	9.76	9.76	9.76	9.76	9.76	9.76
Other	15.00	17.00	22.00	29.00	22.00	26.00	28.00	29.00	29.00	29.00
Total	302.16	399.35	507.38	642.89	762.79	620.02	678.62	723.55	747.81	777.55
Average Economic Return (Le/Ton)	1210.86	1112.80	1014.74	916.68	818.62	720.56	720.56	720.56	720.56	720.56
Total Economic Revenue	-	-	-	104.17	279.08	507.66	802.44	1097.22	1310.11	1441.12
Net Cash Flow	-302.16	-399.35	-507.38	-538.72	-539.55	-212.89	-123.82	-73.67	-562.30	-720.56

Source: Derived from RTI estimates of input costs and assuming a constant cost of Le 2.00 per day for labor.

Since very little of the coffee produced is consumed domestically, the coffee subsector interacts with the domestic economy in much the same manner as cocoa.

The possibility of a decline in the world market price for coffee must be taken into account by the GOSL when considering the feasibility of large scale programs to encourage small farmers to invest in new coffee stands. To be successful, such a program must receive extensive credit and extension support. In the absence of adequate institutional support, investment programs which encourage increased output through better management and husbandry of existing acreage appear to be the best alternative for the small producer. This should not preclude the possibility of some commercial undertakings, but these, as previously indicated, would be of a very different orientation. SLPMB field personnel indicate that the output from existing acreage could be at least doubled through better management, disease control, and selective replacement of old trees.

The projected decline in world market prices also raises the question of the profitability of unrehabilitated coffee stands under the prevailing export duty structure. An alternative to a drastic lowering of the tax rate would be to subsidize rehabilitation programs from current SLPMB revenues. This would allow the GOSL to avoid the problem of lower tax revenues and/or lower foreign exchange earnings which would accompany declining prices.

If a program to stabilize producer incomes is undertaken, the projected world market prices would result in GOSL revenue from coffee export duties becoming zero unless the government is prepared for SLPMB to sustain significant trading losses. Income stabilization does not appear to be an acceptable alternative unless it is accomplished through increased output per hectare.

Based upon the data available, coffee appears to be both privately and socially profitable for at least the next ten years. The need for tax revenues and foreign exchange, and the social profitability of alternative coffee programs suggest that the GOSL should encourage cautious development investment in the coffee subsector.

However, dependence on coffee for tax revenues and foreign exchange must not become so large that world market fluctuations precipitate monetary and fiscal crises.

Oil Palm. The SLPMB oil palm kernel pricing policy has subsidized kernel production and produces a loss for the board. As a result, local producers have chosen to process oil palm fruit at the village level rather than turn it over to the palm oil mill. For 1980-81, the producer's price for palm kernel has been raised to Le 164 per ton. In the absence of a world price increase, the SLPMB loss exacerbates the raw materials problems for the palm oil mills. At present outgrowers are producing no palm fruit for the Daru plant. At current market prices, fresh fruit bunches (ffb) yield Le 37.36 per ton based on an oil price of Le 440 per ton and kernel price of Le 164 per ton, and yields of seven and four percent, respectively.

Table 7-10. Estimated returns to ten year coffee rehabilitation program for five acres with a one acre per year rotation in eastern Sierra Leone (price of coffee projected 1978 constant terms)

Time Period	0	1	2	3	4	5	6	7	8	9	10
Production (pounds per acre)	1250	1150	1150	1650	2000	2150	2150	2150	2150	2150	2150
Costs (Leones)											
Labor	192.50	225.75	257.25	318.50	365.75	395.50	385.00	386.75	357.00	371.00	388.50
Physical inputs	-	52.66	61.33	85.79	118.25	146.95	146.95	146.95	146.95	146.95	146.95
Processing & Marketing	62.50	57.50	58.50	89.50	115.00	112.50	107.50	107.50	107.50	107.50	107.50
Land	10.00	10.00	30.00	65.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Other	7.00	7.00	19.00	44.00	71.00	78.00	81.00	65.00	57.00	63.00	77.00
Total	272.00	332.91	426.08	602.79	758.00	822.95	810.45	796.20	758.45	758.45	809.95
Average Economic Return (Le/ton)	2453.25	2265.13	2077.21	1829.19	1701.17	1513.15	1513.15	1513.15	1513.15	1513.15	1513.15
Total Economic Revenue	-	-102.97	-94.02	343.49	579.94	619.02	619.02	619.02	619.02	619.02	619.02
Net cash flow due for report	-	-163.88	-248.50	12.70	93.94	68.07	80.57	94.82	132.57	112.57	81.07
Total Return	1393.89	1184.10	1085.50	1416.89	1546.52	1478.76	1478.76	1478.76	1478.76	1478.76	1478.76
Net Return	1121.89	851.15	659.73	814.10	788.52	655.81	668.31	682.56	720.31	700.31	668.81
Net Return on 5 Acre Unhabilitated	1393.89	1015.06	908.23	801.40	694.57	587.74	587.74	587.74	587.74	587.74	587.74

Source: Derived from RTI estimates of input costs and assuming a constant cost of Le 2.00 per day for labor.

Table 7-11. Estimated ten year returns to a five acre new coffee planting with one acre per year planting and rotation program in eastern Sierra Leone (price of coffee projected 1978 constant price)

Time Period	1	2	3	4	5	6	7	8	9	10
Production (pounds per acre)	0	0	0	250	1050	2350	3450	4150	4150	4150
Costs (Leones)										
Labor	143.50	197.75	243.25	291.55	380.10	360.50	416.33	451.50	470.75	490.00
Physical inputs	145.70	182.79	225.71	281.52	337.35	247.44	266.16	279.05	279.05	279.05
Processing & Marketing	0.00	0.00	0.00	12.43	57.09	116.62	171.24	205.69	205.69	205.69
Land	1.97	3.94	5.88	7.82	9.76	9.76	9.76	9.76	9.76	9.76
Other	38.00	74.00	106.00	134.00	99.00	131.00	172.00	189.00	181.00	163.00
Total	329.17	458.48	580.48	727.32	885.28	865.32	1035.49	1135.00	1146.25	1147.50
Average Economic Return (Le/ton)	2453.25	2265.25	2077.21	1889.19	1201.17	1513.15	1513.15	1513.15	1513.15	1513.15
Total Economic Return	-329.17	-458.48	-580.84	214.68	811.92	1616.32	2372.89	2854.35	2854.35	2854.35
Net Cash Flow	-329.17	-458.58	-580.84	-512.64	-71.36	751.00	1337.40	1719.35	1708.10	1706.85

Source: Derived from RTI estimates of input costs and assuming a constant cost of Le 2.00 per day for labor.

Figure 6-3 outlined the marketing system for oil palm products. It is clear that the village level producer has several viable marketing alternatives from which to choose (palm oil mill or local processing). The current mill price of Le 40 per ton of ffb appears too low to justify sending fruit to the palm oil mill. When SLPMB raises prices on palm kernel, the supply of fruit to the processing plants is further reduced.

Maize. The assessment team was requested to look at the need, impact, and proposed uses of PL 480 Title I maize for Sierra Leone. Little new information could be discovered. Maize production in Sierra Leone, estimated at around 1,000 tons in 1975-77, has apparently declined some 20 percent. Of this production, about 800 tons was sold to feed mills in 1976 and 620 tons in 1979. Locally produced white maize is inferior to the imported maize preferred by the feed mills. Commercial imports were reported at 337 tons in 1979 and concessional imports at 911 tons. The total (2,173 tons) was a third greater than in the 1975-77 period and more than double the imports in 1978.

Maize comprises about 50 percent of the total feed rations produced by the feed mills at Kissy, Njala and Newton. These mills have a total capacity of 6,000 tons of feed per year assuming one work shift per day. The Njala mill is associated with Njala University College; its 500-ton capacity services the college needs and makes only minor contributions to commercial swine and poultry growers. The Kissy mill with a 4,400 ton capacity had an average annual production of 2,362 tons in the 1976-78 period, down from a peak in 1973 of about 4,300 tons. Most of the purchasers of feed from the mill are also shareholders in the company; 80 percent of the feed is sold in the Western Area within 80 km of Freetown. The demand for feed by poultry meat and egg producers has risen considerably faster than the feed demand by commercial piggeries. Presently, 90 percent of the feed is sold to poultry producers and only 10 percent to pig producers.

The mills are ready to purchase all local maize offered to them although they prefer higher-quality imported yellow maize. The limited demand for their feeds, however, makes the importation of unbagged maize difficult.

Certain areas of Sierra Leone do have potential for greater maize production. Presently, however, there is no indication that maize imports deter local production in any way.

7.1.5 Commercialization of Products

The lack of an adequate rural transportation network and generally poor producer prices are strong deterrents to food crop marketing. Very little rice is commercialized through government channels, and most marketed rice is generated through the trader/money-lender network, apparently as a result of credit payments. The farmer is commonly faced with a monopsony in selling rice and, as a result, either sells at poor prices or retains the crop for self-consumption. Insufficient on-farm storage and debt repayment obligations force farmers to sell at harvest when prices are depressed. Calculations of farmer returns from rice production at official prices generally indicate a farmgate loss. This encourages the farmer to retain rice on the farm and is a disincentive to increasing production for commercialization.

Table 7-12. Costs and returns from one acre of oil palm development in Sierra Leone, 1980, at a yield of 3.5 tons ffb/acre, as observed in Daru

Cost item	Year									Net present Value
	1	2	3	4	5	6	7	8	9-20	
Development Labour	90	18	18	16	-	-	-	-	-	at 12% = Le 63.92
Maintenance and Harvesting Labour	-	-	-	-	38	40	48	48	48	Internal Rate of
Planting Materials	138	29	31	25	-	-	-	-	-	Return = 14.1%
Maintenance Materials	-	-	-	-	33	33	33	33	33	
Total Costs	228	47	49	41	71	73	81	81	81	
Yield (mt)	-	-	-	-	1.5	2.0	2.5	3.0	3.5	
Gross Revenue	-	-	-	-	82.5	110	137.5	165	192.5	
Net Return	-228	-47	-49	-41	11.5	37	56.5	84	111.5	

Data obtained from E.I.A.D.P. phase 3, project document

Based on: 1) Sales of ffb to mills at Le 55/ton

2) 45 days of development labor and 19-24 mandays/year of maintenance/harvesting labour, costed at Le 2.00/day.

In the marketing system, some milling loss can be reduced through modern technology, but marketing costs in general are not excessive compared with other African countries. Low farmgate prices relative to cost of production and particularly to the value of labor is the most serious problem in rice marketing. Transportation costs, storage loss, and middleman profits do not appear to be out of line, although improvements are certainly possible. Until world rice prices increase to a point where farmers can sell rice at an amount exceeding cost, inadequate domestic production will continue.

Because of the high cost of transport, cassava is generally marketed locally. Garden crops are being marketed in increasing amounts and represent a significant production and marketing activity for women. However, transportation between the northern growing areas and urban markets is difficult at present and reduces opportunities for market development. Completion of the Kabala-Makeni road should permit increased commercial yields of northern vegetable crops.

In regard to coffee and cocoa, the policies of the SLPMB have created monopsony positions for the buying agents and their representatives. There does not appear to be any competition at the farmgate level to insure adequate service to producers or to provide price competition. The government farmgate price is posted only after much of the crop has been harvested, denying the farmer the opportunity to determine his harvest activity effectively in light of the price he will receive. Some people favor an earlier price posting. Given Sierra Leone's "price taker" position vis-a-vis the world market for coffee and cocoa, this does not seem possible.

7.1.6 Relationships between Food Crops and Cash Crops

Government policy and agricultural development programs for Sierra Leone have concentrated on increasing rice production through improvement of existing acreages and development of new land, particularly inland swamps. WARDA has indicated that Sierra Leone holds a comparative advantage in the production of rice and should have been able to develop rice production to the point of permitting exports by 1980 (WARDA, 1979). This situation has not developed and current estimates of rice production and consumption indicate continual rice deficits necessitating continued importation.

Although the IADPs have generated some interest in groundnuts and benniseed as potential cash crops, they are at present only experimental and do not produce commercially significant quantities. The SLPMB is also interested in groundnuts and is promoting their production through the provision of seed. Small scale programs in chilles and pentadesma are also being undertaken by the SLPMB, and ginger production may be expanded on a limited basis in the Magbosi IADP. Data on these crops are so limited that detailed analysis is unrealistic.

The major cash crops, coffee and cocoa, are concentrated in the Eastern Province where the EIADP has been trying to interest farmers in producing more of these crops. The results have not been encouraging. According to the SLPMB, the quality of the cocoa is low, and it has been difficult to obtain farmer cooperation in attempts to improve production practices. This failure can be attributed in part to failure of extension services to provide adequate trained personnel. The SLPMB has attempted to develop a more specialized extension service to assist in this area, but

its effect is yet to be determined. The production problem, however, appears to be more closely related to farmer attitudes toward cash crop production in general, and to a distrust of government, rather than an adverse reaction to the lack of extension support.

In the absence of hard evidence, it is difficult to identify specific causes for the lack of cash crop production. Demand for coffee and cocoa seedlings is fairly high; the level of husbandry however, is very low. It appears that farmers in Sierra Leone view cash crops as secondary to the production of rice. This is particularly true for the small farmer who has been the focus of the agricultural development program. The typical farmer seems to view cash crops opportunistically, and to feel they need not be managed or worked in the fashion suggested by the development projects or the marketing board.

From an economic perspective, the farmers' reluctance to increase cocoa production through activities which would increase production costs is rational. The return to the farmer on the additional expenditure would be negative at current and projected prices. Economic returns from coffee production are high, however. Returns per day of labor and annual incomes are highest when farming activities include coffee harvesting and rehabilitation (Table 7-13). The returns are significantly higher than can be obtained for rice production alone or in combination with cocoa production. The reason for the apparent lack of farmer interest in cash crops is difficult to ascertain but it is generally believed that farmers are extremely risk averse with respect to food supply. This leads the farm family to plant and husband rice and other food crops to meet anticipated family needs before considering production of cash crops.

In the absence of reliable information, the reasons for the failure to allocate labor to the rehabilitation, or at least the collection, of cash crops can only be speculated upon. There is some evidence that the price paid to farmers is below the official government posted price, but coffee activity is attractive even if the price is reduced by 50 percent. The farmer may not understand the potential returns from coffee rehabilitation and production. Due to the lack of extension personnel trained in cash crops, lack of producer information must be considered as a potentially strong deterrent to producer activity in this area.

The return to the farmer on new tree crop plantings is not sufficient to encourage activity in this area without an extensive subsidy program. Cocoa planting is not privately profitable and coffee does not provide an adequate return to the farmer for at least five years. It is unrealistic to think a farmer would make investments in cash crops of so long a duration without subsidies or guarantees.

7.1.7 Livestock

Generally, the two principal problems constraining increases in livestock production in Sierra Leone are the low rate of reproduction and the high mortality rates. These problems stem largely from poor nutrition and parasites.

Table 7-13. Average annual potential income from various types of agricultural employment based on 2000 available work days per year for a five year period^a

Type of employment	Expected annual income (leones)
Family labor on traditional upland rice	286.00
Wage labor @ Le 1.75 per day	350.00
Family labor on improved swamp rice	370.00
Family labor on improved upland rice	388.00
Wage labor @ Le 2.00 per day	400.00
Family labor on traditional upland rice with cocoa rehabilitation program on 2 ha	536.96
Family labor on improved upland rice with cocoa rehabilitation program on 2 ha	591.72
Family labor on traditional upland rice with traditional cocoa on 2 ha	656.15
Family labor on improved upland rice with traditional cocoa on 2 ha	730.10
Family labor on traditional upland rice with traditional coffee on 2 ha	916.78
Family labor on improved upland rice with traditional coffee on 2 ha	1,015.72
Family labor on traditional upland rice with coffee rehabilitation program on 2 ha	1,213.07
Family labor on improved upland rice with coffee rehabilitation program on 2 ha	1,269.78

^a Assumptions used are similar to those for table 6-2 and tables 6-7 through 6-10. Yield assumptions are from Spencer, 1979a.

Phosphorus and calcium are vital in promoting reproductive efficiency in animals. Both are commonly deficient in regions of high rainfall. Phosphorus can be fed along with salt as dicalcium phosphate, deflorinated rock phosphate, or steamed bone meal. Calcium can be supplied with either ground limestone or oyster shells. The irregular and delayed estrous which results from lack of these nutrients increases both the age at first pregnancy and the interval between pregnancies.

Salt is important to good nutrition for two reasons. First, animals with free access to salt will eat other feeds in larger amounts. Second, salt facilitates the retention of calcium and phosphorus.

Total plant energy available for ingestion directly influences weight gains and reproductive efficiency. In the dry season it is not uncommon for cattle in Sierra Leone to lose 10-20 percent of their body weight. The storage and preservation of plant materials is not practiced and the feeding of grain concentrates is limited to a few commercial swine and poultry enterprises near urban centers.

Controlling parasites is as important as nutrition in increasing animal production. Both internal and external parasites are relatively easy to control with chemicals. In Sierra Leone, as in other LDCs, the major constraints are the lack of a system to deliver vaccines and chemicals to livestock owners, and the education of owners in how to use them. The MNR is presently building a number of animal health depots to assist livestock owners.

The key to improved animal production for all species in Sierra Leone is an effective extension service buttressed by applied research. Simple management practices to improve the reproductive efficiency and growth rates of the indigenous breeds will yield more rapid and cost effective results than embarking on crossbreeding research programs. Animal nutrition and animal health should be given equal attention.

7.1.8 Inland Fisheries

With only two potential harvests per year, a constant supply of fresh fish from small ponds would require some 26 cooperating farmers to insure weekly harvests. Smoking the fish increases shelf life a few days. Dried fish, however, are popular in Sierra Leone. With a dryer and storage facilities, a few cooperating farmers could provide fish for their families throughout the year.

There do not appear to be any deleterious environmental effects from culturing Tilapia in small ponds. Although the ponds provide breeding sites for malaria-carrying mosquitos, the fish are avid larvae eaters. The effect of the ponds with regard to schistosomiasis appears to be positive: at present women and children wade small canals and streams in search of fish. If pond fish are regularly available, contact with snail-infested water would probably be reduced.

For small pond culture to be successful, children and animals must be kept out of the water. This might present a problem in cattle-grazing areas. Wild animals may also pose a problem in the dry season as they could bring zoonosis-related disease problems.

Not all areas of Sierra Leone have water for ponds available all year round. If the farmer cannot keep his pond operating continuously, periodic re-stocking will be a problem. An important factor in the success of the ponds is that after the initial stocking, few or no further outside inputs are required - fingerlings for recycling, rice bran, and termites are all a zero cash cost input for the system. (The effective cost of production would include, however, the value of the rice that could have been grown on the land in the fish pond. The relative economics, however, are highly in favor of fish ponds).

For inland fish pond culture to succeed, farmers will need assistance for several years to learn proper management practices. While Tilapia are relatively resistant, a disease could wipe out an entire pond very quickly. There is also a great temptation to harvest the larger fish continuously rather than only twice a year. While it seems natural to the farmer to remove fish of edible size, this will reduce total production on an annual basis and precipitate disease problems.

Presently, there are no recommended amounts of rice bran and termites to feed the fish at various stages in the production cycle to optimize yields. This is a needed research area. Research is also needed on pond fertility under the prevailing low pH conditions. Finally, while the subsistence orientation may be appropriate initially, if ponds are to become fully integrated into local farming cycles a degree of commercialization is almost essential and should be encouraged.

7.1.9 Forestry Prospects

Current harvests from Sierra Leone forests are 50,000 m³ per year. The Forestry Division estimates new growth at 60,000 m³ per year. Theoretically, timber harvests could be increased 10,000 m³ per year without decreasing the existing standing volume of 3.7 million m³. This presumes that marketable species are available and that required wood products can be produced. At least the current shortfall of sawn timber could be reduced by expansion of domestic production.

Other prospects for increased forest production exist. The Tama and Tonkolili Forest Reserves have not yet been opened to concessionaires. These forests of 16,000 and 44,000 hectares respectively contain a large volume of timber. Another avenue for expansion of domestic production is the commitment by the German Federal Republic to finance the expansion of the government-owned Forest Industries Corporation.

The continued availability of fuelwood for domestic needs is a distribution rather than a physical scarcity problem. The traditional bush fallow system produces bush and scrub wood which is used both for subsistence firewood and to supply urban markets. Logging wastes and residues are a large potential fuelwood source but are not located near the consumer. Increased transportation costs and distances are likely to result in an economic scarcity for the urban consumer.

One tenth of the estimated 2.5 million m³ of fuelwood consumed each year is for the Freetown market. The Atlanta consultants recommended that firewood and pole plantations be located near Freetown. The utilization of

logging wastes and the introduction of efficient methods of charcoal production are other possibilities which merit investigation as means of reducing the scarcity of fuelwood.

7.1.10 Soil Conservation

The bush fallow system of cultivation practiced in Sierra Leone, with fallow periods now as short as three years in certain areas, is posing potentially serious problems of soil erosion. The short fallow periods have resulted in lower soil fertility and, in turn, have increased pressure to find new lands for cultivation. Often, these are lands on steep slopes or areas with very shallow soils which were previously judged unacceptable for cultivation.

A program of soil and water conservation is needed in Sierra Leone. The FAO/UNDP Land Resources Survey Project is studying the erosion problem and water shed management. This project is projected to become a land and water division of the MAF, taking advantage of previous studies and creating an administrative unit with responsibility for a soil and water conservation program. The Forestry Division is not presently organized or staffed to perform this function, although it would clearly fall within the policy objective of the ecological protection of the natural vegetation.

7.2 SOCIAL ASSESSMENTS

Although rural society in Sierra Leone has not undergone a radical restructuring through either large-scale collectivization or the emergence of a full-blown capitalist farming organization, significant changes in the agricultural economy have taken place during this century (roughly since the beginning of the colonial period). These changes include the effective reduction of the basic farm unit from a large extended group to simple conjugal households and the adoption, albeit slow, of cash crops such as cocoa and coffee. As these examples illustrate, Sierra Leone's rural economy should not be viewed as historically static.

This section analyzes six major current themes in Sierra Leone's rural society and economy: labor supply, land tenure, credit, farmers' associations, equal access to agricultural resources, and agricultural innovation.

7.2.1 Labor Supply

Given prevailing wage rates and labor productivity, the rural labor supply is insufficient to meet the demands imposed upon it by the changing agricultural sector. An economic labor shortage exists. To some extent, this is a historical phenomenon, tied to chronic labor bottlenecks during peak agricultural seasons. The problem has been compounded in recent years, however, by migration out of farming regions and by the increasing labor-intensification of certain new agricultural (especially rice) technologies.

The peak periods of labor demand in Sierra Leone, including total demand for both male and female labor, are April-May for brushing and planting, July-August for weeding, and October-November for harvesting (Figure 6-1).

It is hard to see how labor-time can be more evenly distributed throughout the year unless capital is substituted for labor. Double-cropping also doubles the occurrence of seasonal labor shortages by creating additional peak periods; these may be further exacerbated by conflict with valued non-farm activities of both economic (e.g. house-building, processing palm oil) and religious (initiations, weddings) natures.

Migration to towns and mining regions is currently increasing the scarcity of rural labor. Byerlee, Tommy, and Fattoo (1976) reported a net rural-to-urban flow of 50,000 persons a year, or almost two percent of the nation's population.

As young men comprise a large proportion of these migrants the remaining rural population consists increasingly of children, adult women, and the elderly. Numerous observers have commented on the resulting diminution of the farm population; Tommy (1980) has observed that villages often combine and Moseley (1978) noted that "the adult sex ratio (in three Limba villages) was 1,611 females per 1,000 males". Migration has led to an increase in the number of de facto female-headed households, which find it especially difficult to hire male labor necessary for land preparation. They cannot call on the same range of family kin, nor do they have the necessary cash to pay hired laborers.

This outflow of able-bodied workers may have caused a decline in total agricultural labor in Sierra Leone, with a rising dependency ratio as a result. It has certainly reduced the average labor expenditure per rural inhabitant despite a possible intensification of work by those -- especially adult women -- staying behind after the migrants' departure.

In principle, a certain amount of rural-to-urban migration is useful and necessary to a country's economic development, especially as skilled, high-productivity urban jobs are created and as labor productivity in agriculture increases. However, in Sierra Leone, where low-productivity service sector jobs have proliferated, rather than high efficiency industry, and where the productivity of farm labor has not progressed significantly, rural-to-urban migration is a more deleterious process. Moreover, such migration seems to have been unnecessarily aggravated by both explicit and implicit long-term government policies favoring mining and the urban economy at the expense of agriculture.

The introduction and promotion of certain new farming technologies has had a variable impact on the demand for labor. According to Spencer (1979), boliland tractor plow cultivation has reduced labor requirements from 112 days to 68 days per hectare. The reduction has been in male labor time for plowing, while female labor time has risen by 40 percent with the increase in area cultivated. Weeding and harvesting, both female tasks, remain labor-intensive and unaffected by technological change, thus increasing women's work burden. On the other hand, improved upland techniques have raised labor inputs by 20 days a hectare, while developed swamp farming has boosted the labor component by 34 days a hectare in the north and 62 days a hectare in the south. Here the increase in women's labor time is in processing. With the higher yields, women have more rice to thresh, parboil, and store.

Spencer's study of a village in the EIADP (1976) also showed a large increase in individual labor expenditure as a result of swamp development. According to his sample farm households, adult men outside of the IADP worked 1,020 hours a year while those in the first and second years of the project labored 1,968 hours and 1,328 hours, respectively.

Three major conclusions may be drawn from the preceding analyses of the rural labor situation.

1. Intensification of individual labor is possible in rural Sierra Leone, as Spencer's data on increases of yearly male labor expenditure in the EIADP shows. This increase in working hours is limited, however, by off-farm activities, the large number of sick-days for rural folk, and perhaps by cultural preferences for dry-season ceremonies and festivals.
2. New labor-demanding rice technologies may not be appropriate in Sierra Leone. There is evidence that swamp development is not privately profitable even at current wage rates, which still do not elicit sufficient labor.
3. Introduction of improved technologies which increase acreage will have variable impacts on labor time for men and women given the rigidity of sex roles in agricultural production. Labor-saving devices such as rice mills and new harvesting techniques should be introduced to decrease labor time devoted to food processing and preservation.

7.2.2 Land Tenure

Analysis of the land tenure system in Sierra Leone requires a four-part approach, with each part pertaining to a different set of tenure conditions: annual crops on uplands, tree crops, swamps, and grazing lands.

The prevailing system of tenure on uplands devoted to annual food crops using bush fallow rotation is equitable, unambiguous, and flexible. It provides access to lineage farm land for all of Sierra Leone's rural population. The short term occupation of uplands for food crops prevents outsiders from lodging longstanding claims to the land. Outsiders may obtain us rights through the various forms of tenancy. The absence of conflict over such uplands, is, of course, due to their relative abundance and to the low demand for such land by outsiders.

The current tenure pattern on uplands planted in tree crops is apparently also rather problem-free. The generally accepted norm of use-rights to tree crops -- "the community recognizes the right of a person to the unhindered enjoyment of a land, so long as he derives a benefit from it" (Bandyopadhyay, 1980) -- seems to be respected in the Eastern Province, where most cash crops are raised. Apparently, too, outsiders have had no difficulty in obtaining parcels for tree crop cultivation through the tenancy options: "Even for strangers and foreigners, lease is not difficult, provided they go about it with an understanding of the sensitivity of the owner-families" (Bandyopadhyay, 1980). Although tenure conditions concerning tree crops may currently be uncontroversial, rapid expansion of

cash-cropping in Sierra Leone may provoke the same problems that have emerged in the Ivory Coast and Ghana: strangers being driven off the land after investing in cocoa and coffee; outsiders transferring use-rights to other outsiders without consulting their indigenous host land-holders; individual indigenous farmers selling land-use rights to outsiders without the approval of the lineage; and widespread land speculation.²

The development of swamps with water control structures has led to a series of land-tenure problems. Such development has modified the water-courses which frequently mark boundaries between villages. Given the collective nature of constructing water control bunds and gutters, swamp owners lacking an interest in such development have sometimes thwarted the efforts of their more enthusiastic neighbors. Clearly, these conflicts will have to be resolved by village councils. More serious is the fact that swamp owners are now frequently reluctant to lease their bottomlands to outsiders, for fear that they will permanently forfeit claims to those swamps. Moreover, outsiders are hesitant to invest in improved swamps, since cases of strangers being evicted from developed swamps are being reported.

With chiefdom officials often holding the largest swamps, it is problematic whether the same officials who settle land dispute cases will either protect the use-rights of outsiders or devise a satisfactory lease-hold arrangement for the swamps.

In the northern district of Koinadugu and Tonkolili, where most of the nation's livestock is grazed, the conflict between cattle herders and swamp farmers during the dry season is becoming acute, with more acreage being devoted to dry season crop production. KIADP project officials say that cattle damage to crops is the most serious problem. It is unclear whether such crop depredations are caused by the negligence and malice of herders, or whether cattle owners are now being deprived of traditional watering and grazing sites for which they continue to pay a yearly fee to the local chief.

Four problem areas may be identified in the area of land tenure:

1. Based on the prevailing tenure conditions, the registration of extensive rights in the name of the lineage or other large-kin group will be needed. Turay's questionnaire (1980) on land tenure indicated that most farmers favored some form of registration. In view of the enormous individual and national expense involved in such a task, however, it is unlikely that rural land-holders will actually request registration unless a parcel is in acrimonious dispute.
2. Given the high incidence of strangers' evictions from developed swamps, a minimum guarantee of tenure security is needed for all swamp farmers. Whether swamp holders have willingly granted five year leases and respected the terms of the agreements is unclear. The national government has not taken any action to

² Some of the demand for coffee and cocoa seedlings noted earlier may be related to the tenure issue, i.e., farmers may be attempting to secure tenure to upland farms by planting coffee and cocoa.

clarify the confusion over use-rights to developed swamps.

3. It has been proposed that all land be subject to freehold law, which currently applies only in the Western Area. The argument is that the absence of freehold blocks the creation of a land market, deprives security of tenure to outsiders capable of making major farm investments, and prevents the use of freehold titles as collateral against agricultural loans.
4. It has been recommended that farmers in the livestock producing areas build fences around their crops to prevent incursions by cattle. Whether the high costs of such fence construction will be assessed directly to the farmer, through subsidies, or through a surcharge on herders' annual grazing fees has not been determined. Neither has the subsequent grazing and watering difficulties of the herders been addressed.

7.2.3 Credit

The share of total rural credit demand satisfied by the informal system has been variously estimated at 80 percent to 97 percent, but the mechanisms and terms of these loans are virtually unknown. Each year, however, a large proportion of rural households seeks and receives informal credit as gifts, interest-free "friendly" loans, and high-interest "business" loans. Most of this is consumption credit to sustain farmers and their families during the June to September "hungry season" prior to the main harvest.

Despite the responsiveness, reliability, and high repayment rate of the informal network, such credit is generally short-term and consumption-oriented, thus precluding major long-term agricultural investment. It also involves high interest costs of 30 to 40 percent over a 3 to 4 month period (i.e., over 100 percent per year), which cuts heavily into farm profits.

Direct government sponsorship of rural credit has been limited to the cooperative experiment in the 1960's. The cooperatives were essentially used to channel credit to small farmers and to market produce, but a combination of mismanagement and poor credit supervision led to their rapid demise. Another factor leading to their decline was the direct involvement of the SLPMB in the marketing of cash crops.

In the last few years, IADPs have offered credit to their participating farmers both in kind (tools, fertilizer, seed) and in cash for wage labor, for long-term capital development, and for seasonal production costs. Their response has been overwhelmingly enthusiastic, indicating that IADP credit terms are highly attractive when repayment default is tolerated -- and that Sierra Leone's rural population harbors no cultural bias against accepting institutional credit.

Government initiated or supported rural development projects, such as the U.N. World Food Program, which distributed free inputs and tools to farmers, have also bred a powerful "gift mentality" among the rural population. Many farmers now appear to regard any agricultural resources emanating from Freetown as give-aways, another factor contributing to loan defaults.

Women are usually excluded from credit schemes for a variety of reasons: their land-holdings are too small to provide sufficient collateral, they are discouraged from applying by socio-cultural biases, and they are often not invited to village meetings where credit information and procedures are explained. One possibility for overcoming these handicaps is through women's organizations. Women farmers can be organized into groups to facilitate contact with male loan officers. By pooling resources, they would have enough acreage to qualify for credit.

The Bank of Sierra Leone has proposed the creation of a series of chiefdom level rural banks owned partly by the Central Bank and partly by rural shareholders (BSL, 1980). This scheme, which has apparently been applied with some success in the Philippines, seems unnecessarily complex for a country like Sierra Leone, which has had little experience with agricultural credit.

Whether the repository for rural credit is ultimately an IADP or an autonomous village revolving loan fund, the key features of an effective credit system would appear to be: a guaranteed source of start-up capital (e.g., Bank of Sierra Leone, IADPs, village savings), minimum overhead for administration (here the chiefdom bank idea seems especially burdened), the provision of consumption credit as well as production credit, and enforced repayment through penalties and peer pressure. If these key features are not incorporated, the credit scheme becomes a short-lived, unprofitable exercise in subsidizing a few select farmers.

7.2.4 Farmers' Associations

Farmers' associations are not currently institutionalized on a nationwide basis in Sierra Leone. Many of the local associations which do exist were initiated by outside "catalysts", e.g. Peace Corps Volunteers, and have experienced mixed success. As conduits for technical information on farming from extension agents to villagers, they have generally been effective. Purchase of inputs on a cash-on-delivery basis has also worked smoothly, but provision of inputs on credit has caused problems, since this involves more complicated procedures for ordering supplies and enforcing repayment.

Quite recently both the FFC in the EIADP and the NIADP have established farmer groups to supervise credit and to facilitate the spread of extension services to project farmers. It is too early to render a verdict on these large-scale efforts to organize farmers, but it would appear a priori that the extension function of such groups is more feasible than their potential credit-handling role.

The advisability of establishing farmer associations in Sierra Leone has been expressed by government officials, foreign donors, and by farmers themselves on several grounds: the low cost of bulk inputs and credit, the effective diffusion of agricultural techniques to both men and women farmers, the encouragement of autonomous village-level development, and the potential spillover into other types of community self-help (schools, clinics, etc.).

Women farmers in particular have expressed the need for farmers' associations. Working with women in groups is one of the few socially acceptable ways for male extension agents to reach women farmers. With so few female extension agents trained, women farmers presently have extremely limited access to technical information and inputs. Also, by pooling resources, women can more easily qualify for credit programs.

Three points appear to be relevant to future efforts in the area of farmers' associations.

1. Because of the relatively low level of education and experience with cooperatives on the part of Sierra Leonean farmers, a gradualistic approach seems advisable, starting with their role in extension and slowly adding their other functions.
2. Village leadership will be important to the stability and growth of farmers' associations. Popular officials and religious leaders can add great credibility to such groups and should be enlisted early on. The most important leadership qualities may vary with the functions of the association: a young, energetic, krio-speaking farmer might be ideal for extension contact, while a village elder respected for his honesty and literacy might best handle the distribution of credit. Adaptability to differing local situations is essential.
3. Pre-existing forms of social organization and their possible appropriateness as modified farmers' associations should be considered. Among the central Mende, for example, the tradition of cultivating a communal swamp under the chief's supervision might be parlayed into a demonstration of new techniques of water control and fertilizer application. Among the Karanko, large labor exchange teams composed of middle-aged household heads might be transformed into input purchasing groups. Among the Temnes, extended kinship groups which regulate land use among members might allocate a complete swamp for modernization and manage the provision and repayment of revolving credit to its members.

7.2.5 Equal Access to Agricultural Resources

Given the highly limited agricultural investment resources available to the GOSL, it is hardly surprising that these resources are currently rationed in a manner that precludes equal access for all farmers. Simply stated, some farmers can get the inputs, others cannot.

The first division into haves and have-nots is between the IADP regions, which are relatively well-endowed, and the MAF-supervised areas, which are poorly provisioned (except for the Bolilands and other tractor-plow zones and Peace Corps/CRS sites). Provinces covered by the KIADP (half of Koinadugu), NIADP (parts of Bombali and Tonkolili) and EIADP (Kenema and parts of Kono and Pujehun) are the lucky ones.

Government plans to blanket Sierra Leone with IADP's may eliminate the regional bias, but even within the Project areas, funds are only sufficient to reach about 20 to 30 percent of all farm households. Optimistic government projections indicate that a comprehensive network of IADP's would enroll 55,000 farmers nation-wide, or about 20 percent of the country's rural households.

Beyond this, there is the question of access to project resources. Interviews with project managers in Kabala and Makeni suggested that the better-off farmers -- chiefs, religious leaders, big-men -- were joining the IADP's while the poorer members of the community remained outside. Women farmers probably have the least access to project resources.

While this bias toward the relatively affluent may be partly explained by their greater initiative and energy, both project managers frankly admitted that the structure of the IADP's favored the wealthy farmer. A KIADP requirement that farmers hold a swamp of at least 1.2 ha has discriminated against many land-scarce households. The late delivery of inputs to some NIADP participants has also meant that wealthy farmers with savings and calls on labor from kin and clients have been able to finance swamp development while poorer farmers have been stranded. Some of the current bias against the poor but motivated farmer might be removed, however, by reducing minimum acreage rules, ensuring timely input delivery, and forming farmers' associations to encourage outreach (for both men and women) and eventually lower the costs of delivery of inputs and extension services.

Current USAID emphasis on designing projects for the most impoverished segment of the population raises the issue of rural inequality in Sierra Leone. Byerlee and King (1977) have calculated a gini coefficient (a measure of deviation from a 1 to 1 population: income distribution) of 0.32 for rural Sierra Leone, much lower than Paukert's national figure of 0.56 and rather low in comparison with other countries. This indicates that income is fairly equally distributed among the rural population but that significant disparities exist between rural areas and towns.

USAID's development philosophy seems clearly oriented toward small-scale village level farmers. USAID may argue, with justification, that small-scale subsistence farmers should be the target population, but it will be very difficult logistically and perhaps inadvisable in practice to exclude the rural elite, for several reasons. First, the elite farmers are often innovative and exercise leadership that will induce the rest of the rural population to join the project. Second, the distinction between the rural elite and subsistence farmers is not a rigid one based on inherited or caste-like positions, so that a young subsistence farmer may well be destined to become a small entrepreneur.

7.2.6 Agricultural Innovation

In the context of Sierra Leone's agriculture, the issue of farmers' attitudes toward innovation needs to be seen, first in terms of a credible model of farmer production strategies, and second, in terms of the appealing and unpopular features of various potential changes in agriculture: new crop mixes, input combinations, husbandry practices, and labor patterns.

Two models for farmers' economic behavior have been proposed: the target income hypothesis, and the profitability or rate of return hypothesis.

The target income hypothesis states that farmers have fixed income needs, both in consumption and purchased goods, and gear their production activities to meeting those stationary targets. No amount of encouragement can, therefore, lead to expanded production. In fact, higher prices for commercial crops will result in the lower output required to match cash targets ("backward-bending supply curves").

Evidence of price responsiveness in supply from Sierra Leone tends to contradict this hypothesis. Both Saylor (1967) and Levi (1974) deduce positive supply responses to higher prices for palm kernels, cocoa and coffee. In fact, Levi argues that if the SLPMB had not deprived farmers of such a large share of world prices for these commodities, output would have been considerably greater.

The profitability hypothesis maintains that farmers' choices of crops and production techniques are based on the anticipated relative profitability of these various crops and techniques, given the constraints under which they operate. This argument seems plausible, especially when the enormous constraints on production are considered: expensive labor, scarce capital, highly imperfect information on prices, uncompetitive marketing, high risks due to environmental conditions, and poor extension services.

Risk evaluation has not been explicitly studied in rural Sierra Leone. It is clear, however, that unreliable marketing of rice (reflected in fluctuating prices) makes specialization in export crops at the expense of food self-sufficiency unacceptably risky for nearly all farmers. For this reason experimentation with innovations which do not threaten home food production -- small trials with new rice varieties or with fertilizer, for example -- is welcomed by most farmers, while technologies which sacrifice food output for cash crops are rejected.

Because environmental factors make production outcomes somewhat unpredictable, farmers investment decisions tend to be weighted heavily toward short-term food output with low returns at the expense of crops with delayed results such as oil palm, cocoa, and coffee, even when returns on these export crops are potentially high. Production of the export crops is also subject to considerable yearly variation due to weather and pests, so high profitability is not guaranteed. Farmers do recognize that returns on cash crops can be impressive but unpredictable yields and high rates of time preference lead to a high effective discounting of those returns. These variations may result in a risk averting behaviour that insures a constant level of output rather than one which attempts to be price responsive.

Once export tree crops are planted and reach bearing age, it appears that Sierra Leone farmers pursue a different production strategy that involves lower costs, fewer risks, a shorter delay period, and thus a lower discounting of possible returns. Seasonal labor requirements for mature tree crops are minimal (especially for cocoa). Farmers can wait until well into the rainy season before they judge the size of the crop and allocate labor to it,

and if prices are announced before October, they can also wait for the information before harvesting. This kind of rational short-run strategy induces minor shifts in cocoa, coffee, and palm kernel supply from year to year, but is incompatible with the major increases in output which can only result from medium (spraying and pruning) and long (clearing and new planting) time-horizon investments.

Among the agricultural innovations which have appealed to Sierra Leonean farmers, improved seed and fertilizer have proved to be the most popular. Neither input requires much increase in labor and improved seed involves little additional capital outlay. Rising future costs for fertilizer may dampen enthusiasm, but current subsidies, direct and indirect through cheap project credit, have sustained interest in this miracle medicine for increasing rice yields. The response to swamp rice cultivation seems to depend on the complex series of factors, including population pressure on uplands, labor requirements, yields, competing crops, and a tradition of swamp exploitation. For this reason, the appeal of swamp development needs to be studied on a regional, or even micro-regional, basis.

No study of the sociological profile of agricultural innovators has been conducted in Sierra Leone, but impressions gathered from project officials, extension workers and Peace Corps Volunteers suggest that low-cost, low-risk innovations such as seed and fertilizer are first tested by young farmers, especially those who have been to school or had experience in towns. High-cost innovations, such as swamp development, are first undertaken by middle-aged "big-men" and local politicians who have easier access to swamp-land, family labor, and savings.

Finally, a number of general attitudinal constraints on agricultural innovation have been proposed for Sierra Leone. Two constraints which seem to be valid are the strong dietary preference for rice as the exclusive staple crop, which will make it very difficult to introduce substitutes, and considerable farmer suspicion of government, which will only gradually be overcome.

It has also been alleged that Sierra Leone's farmers place a low cultural valuation on swamps as opposed to uplands, i.e. "farm" in the Sierra Leone context is normally taken to refer to uplands, to which a certain amount of prestige adheres. Swamp farming is newer and somewhat suspect. The disease factor (real and/or perceived) also creates reluctance to farm in the swamps.

7.3 INSTITUTIONAL ASSESSMENTS

7.3.1 Introduction

In the assessment of institutions serving agriculture, major attention is given to the MAF and the IADPs, with particular focus on agricultural extension. The assessment is based on literature review and personal interviews. Institutional assessment is difficult because institutional structure and management issues are often confused with personalities. It is clear that reorganization and improved management of government institutions and other agencies involved in agricultural

development is of serious concern to many. Both Sierra Leone officials and representatives of donor organization recognize that institutional realignments are required to serve long run needs.

7.3.2 Ministry of Agriculture and Forestry

The fundamental problems of the MAF stem from the absence of a clear program and from the misdirection or misallocation of resources. The Ministry basically has the budget and the manpower required to discharge its responsibilities, if these resources were rationally allocated. That they are not is generally recognized; an encouraging sign is the official recognition of this fact and the initiation of efforts toward an eventual restructuring of the entire operation.

A recurrent theme of commentaries on the current state of the MAF is that existing capabilities are being stifled and frustrated by the lack of clear program guidance and a consistent and workable management framework by the unimpeded exercise of patronage which overloads the system with unskilled, redundant staff; and by a reluctance to delegate authority once acquired. The effect has been to encourage donors to sponsor alternatives through a series of dis-integrated, virtually autonomous projects.

The MAF is very weak at the upper technical levels and vastly overmanned at the lower levels, the latter consuming the bulk of the recurrent budget. The upper-level technical strength has been sapped by the Ministry's own policy (albeit not consciously planned) of accepting the donor projects, particularly the IADPs, as the prime vehicles for agricultural development. Because the projects generally are responsible directly to the Permanent Secretary, authority over the agricultural program has tended to accrue to the PS's office at the expense of the Chief Agriculturalist and technical staff. In this situation program planning tends to become a function of "grantsmanship" taking place in the offices of the Minister and PS, with senior technical staff in reactive roles.

The MAF also suffers from a lack of manpower planning. The problems encountered in the course of this study in obtaining accurate figures on the number of extension workers, the first step in such planning, attest to this. Large numbers of technicians have been trained without any projections for requirements or assessments of their capabilities and effectiveness. This lack of manpower statistics and performance records makes the planning of in-service and overall up grading of training virtually impossible.

There is essentially no guidance emanating from the MAF on policy matters -- no national research program, no guidance for the extension program, no production or marketing or price policy studies, no resulting recommendations for GOSL consideration. In short, the MAF as such is incapable of directing and implementing field operations or advocating farmers' interests. The Ministry of Natural Resources, separated from Agriculture and Forestry in 1978, suffers from similar structural and programmatic weaknesses.

7.3.3 Integrated Agricultural Development Projects

The IADPs, which are still a part of the MAF, have diverged from the established institutional patterns and in doing so have achieved greater (through largely unmonitored) successes, but have also created divisions, duplications and anomalies. Because of the donor assistance to these projects, they have considerably more resources at their disposal than the Ministry, enabling them to pay higher salaries and provide workers with better program and logistic support. As noted above, some of the top MAF technical staff have been drawn to these projects (some seconded or assigned, others employed directly by the projects) due to the salaries (an "incentive" is normally paid to MAF employees assigned to the projects), perquisites and better focused and supported program. And, although IADP management is not universally successful, it contrasts favorably with the prevailing system of the MAF and contains some features the MAF would do well to emulate.

The major problems with the IADPs are that they (1) promote the splitting of the country into semi-autonomous agricultural enclaves, each promoting its own approach to development and each with its own management and personnel system, salary and benefit scale and operating procedures, and (2) often result in parallel or redundant structures or programs. Particularly in the case of the earlier IADPs (Eastern and Northern) the situation arises of both MAF and the projects working in the same areas, with only vague differentiation of responsibilities and authority.

These problems are generally recognized, and have become more immediate as the MAF begins to confront the question of phase-out of donor assistance and termination of project status; the need for standardization of programs, personnel and management systems and re-integration of agricultural development efforts is clear. As the initial step in this direction the Minister, in early 1979, appointed a committee,³ comprised of IADP Project Managers, MAF administration, and the Division of Agriculture (CA's office as well as Provincial Agriculture Officers), to develop recommendations for the "integration of IADP projects with the Division of Agriculture".

7.3.4 Agricultural Extension Services

Extension Personnel, Numbers and Training. Comparing projected needs with the capacity to train, it appears that a shortage of extension workers is imminent, especially at the AT and AI levels. Otherwise, opportunities to upgrade the extension staff may be lost and the benefits from new projects may be deferred.

Proposed projects are expected to include substantial numbers of extension workers in their staffs. However, accurate data on the total needed was not available. Therefore, the number of extension workers needed was estimated using two approaches. First, proposals for some of the new IADPs were reviewed. Second, farmer extension ratios were applied to the number of small holders.

³ *The report of this committee provided a basis for the IBRD-sponsored study in 1981 on the proposed restructuring of the MAF and MNR.*

Project proposals for Magbosi, Moyamba and ACRE provide some guidance as to extension personnel needs (Magbosi Appraisal Report, Magbosi Main Report Vol. 1, Moyamba Appraisal Report, ACRE Proposal 1979). There are large inconsistencies in numbers within some of the project proposals. Hence, it appears that the number of new AIs and ATs needed for these projects, for new projects at Kambia, Port Loko, and Bo/Pujehun, and for extensions of the Northern and Koinadugu IADPs is between 335 and 675.

The second approach to estimate the number of extension workers needed is based on a ratio of small holders to extension workers. The ratio is essentially a goal. If the desired ratio is 300:1, as suggested by the Deputy CA for Extension, a total of 953 (286,000 divided by 300) would be needed, or roughly 725 more than at present.⁴

MAF records indicate that since 1970, NUC has produced 179 AIs; since 1974, Mange has produced 333 ATs and since 1976, Makali has graduated 343 ATs. These total to 676 junior extension workers, assuming the 179 AIs were once ATs. The total has been reduced by attrition and placement in non-extension jobs; no one knows just how large the actual pool of extension workers now is. If the 226 is an accurate figure, nearly two-thirds of those trained have left the service. It is assumed that new extension workers will be mainly the newly trained, i.e. they will come from the training programs. NUC has a capacity of 48 AIs per year. The training centers can train from 60-120 per year depending on whether both centers continue to be used for that purpose and on whether an adequate budget will be available for training at this rate.

In-service training to improve the skills of extension personnel in their present positions and to provide incentives and encouragement is the other extension training component. In the past this has been provided on a more-or-less ad hoc basis. A regular program of specialized in-service training is badly needed. If a grant proposal now pending is approved, Makali will be specialized for in-service training.

Need for Extension Specialist. Extension can, on its own, produce some information for farmers, but must rely primarily on research outputs. Most extension services bridge the gap between research and application of information by using subject matter specialists.

MAF extension does not have positions for specialists in specific subjects such as rice production, coffee, cocoa, marketing, etc.⁵ Access to experts such as those at the Rokupr Rice Research Station is limited by the organizational structure and by lack of transportation of extension field personnel.

⁴ *The most recent estimate of extension workers, from the Crop Protection Branch Proposal of 1979, was 226.*

⁵ *Until 1978 the extension service had livestock specialists. As previously noted, the MNR, formed at that time, was assigned responsibility for livestock. The organizational chart for MNR includes positions for specialists in livestock, range, and fodders. Extension's ability to utilize these specialists in their educational programs depends on establishment of some understanding between MAF and MNR.*

Whether extension has specialists or not, extension does need access to expertise for in-service training and for specific problems that are beyond the assignment or expertise of field staff. Interviews with field staff during this assessment revealed that most had no idea of where to go for specialized assistance other than their administrative superior. While more senior persons would be expected to possess more knowledge and experience, current information and technical skill on a particular subject does not come from seniority but from specialization. The answers indicate that specialized support is not expected.

Extension Implementation. The quality of agricultural extension has varied widely throughout Sierra Leone. Generally speaking, extension services within the IADPs have been better than those outside project areas where MAF handles extension activities. The explanation for this difference is clear: the IADPs have a set extension program for their agro-technicians (ATs) or "field assistants" to carry out, backed by a full complement of resources (inputs, credit, vehicles). The MAF, on the other hand, frequently lacks both a program idea and the resources to implement it. In addition, the IADPs provide additional in-service training to their extension workers, while the MAF's extension personnel's training usually ends when they leave the induction training programs.

Within the IADPs, the most effective extension program in operation appears to be the "fortnightly visit" system. Under this system, developed in India and Pakistan, an extension agent visits each village for which he (or she) is responsible once every two weeks. Work is undertaken through a contact farmer or village "master farmer", who is chosen by his peers on the basis of his leadership or farming ability. The extension agent either teaches the contact farmer, who passes on the agronomic practices to his peers, or performs a demonstration for all of the project farmers on the contact farmer's plot.

The extension agent is required to keep and submit to his superior a diary or log-book in which he records his daily visits. The superior, or agricultural officer, make periodic spot-checks to verify that his agents are indeed carrying out their visits. Also, once every two weeks, all of the agents in a region meet with their officer for discussion of current problems and dissemination of new techniques or project information. Even though the "fortnightly visit" system in the NIADP may not actually operate as smoothly as it appears to on paper, its great advantage is that it imposes regularity and discipline onto the entire extension effort.⁶

Neither the IADPs nor the MAF regions meet the need for female extension agents. There is only one female AT in the non-IADP regions, and a handful in the IADPs. Given the socio-cultural norms which do not allow for easy, frequent contacts between male extension agents and female farmers, it seems imperative that more women be trained in agricultural extension.

⁶ In the NIADP, for example, each agricultural officer supervises seven or eight assistants. One assistant interviewed by USAID had responsibility for 20 villages, in which project farmers were developing 150 acres of swamps, 60 acres of groundnuts, and over 300 acres of upland rice.

This is especially relevant given the sex division of labor. Since women usually plant, weed, and harvest rice, any new techniques in planting, weeding, or harvesting must be addressed to them. Training of more female extension agents, in-service training of male extension agents to teach them to work with women farmers in groups, and coordination among ministries which deal with rural women would improve women's access to extension services.

Finally, there seems to be little use of village school curriculums, radio broadcasts, and audio-visual methods such as mobile farm extension units to spread agricultural information. Radio especially might be a cheap and efficient mechanism for farmer education.

ACRE Project and Extension. The ACRE project paper makes the following points regarding the improvement of extension operations:

1. Small holder involvement in decision-making (e.g. the development, testing and delivery of improved technology) and farmer resource commitments in support of extension activities are critical to achieving extension objectives. Farmer involvement and resource commitments can be most readily achieved if: (a) There is effective two-way communication between extension workers and participating farmers; and (b) extension advice is crop-specific and locality-appropriate.
2. Direct linkage of extension operations with the research effort will help insure that improved practices found acceptable to farmers can be introduced into farmer and extension worker training programs. Further, such arrangements will facilitate feedback to the research staff of farmer experience with the improved practices.
3. Accountability for extension personnel to the local population being served by the project is an important variable affecting the success of the agricultural knowledge transfer/acquisition process.

Implementing these guidelines requires a process through which the extension system is developed from the local level upward. If ACRE can effect all, or even some, of these changes and clearly demonstrate the benefits to the Extension Service and other projects, an important step will have been taken toward the revitalization of extension work in Sierra Leone.

Summary of Extension Problems. Problems noted in extension are several and severe. First, and most critical, is the lack of mobility of field personnel. They must have vehicles, fuel, and maintenance capabilities in order to be in contact with the people they are to serve. Personal contact is absolutely essential because it is one of the few media available. Placing more extension workers in the field without mobility may actually detract from the image and effectiveness of the organization.

Second, the MAF is not developing the infrastructure to continue post-IADP project progress. The IADPs are carrying out some effective extension programs, but these are restricted to the project areas. Part of

the frustration in the extension and training branch is that the IADPs are leading the way but the rest are unable to follow. Non-project extension workers do not have a mechanism for program planning. They do not have access to information or specialists. They are discouraged by low and irregular salaries and there is little communication within the organization.

Third, as new projects start, more extension workers will be needed. The training programs will not be able to fill the need in the next two or three years. New projects will provide upward mobility and opportunities for professional growth for extension workers. These people will need a different kind of in-service training than is presently available.

Fourth, extension and training receives little guidance from external sources. There is no national advisory group that meets regularly to surface and discuss agricultural development. No group seems to have an overall perspective on opportunities, problems, and solutions. Such a group has been discussed in the past but does not exist. No one is tapping the leadership of the nation to help determine agricultural policy.

Fifth, the GOSL has conducted so little research into agricultural production and marketing that a localized information base essentially does not exist. Although NUC could be leading in research, it is not and cannot lead under present circumstances. Extension can facilitate, organize and teach the people how to do things, but it needs a research base. Rates of return to research and extension have demonstrated that this is a sound investment of public funds.

7.3.5 Agricultural Research

Given the location-specific nature of agricultural production, any nation needs to have applied research centers in order to improve crop and livestock production over time. Presently, there is a great lack of applied research activities in Sierra Leone.

The most important research station presently in operation is the Rokupr Rice Research Station (RRRS). Its basic activity is rice variety improvement. In recent years, RRRS has benefited from assistance from a FAO/UNDP project in conjunction with the International Institute of Tropical Agriculture in Nigeria and the West African Rice Development Association. Variety performance trials for various kinds and levels of fertilizer treatments are being carried out for three rice ecologies (mangrove, inland valley swamp and upland).

RRRS receives an annual recurrent budget allotment through the MAF in addition to the above-mentioned support. However, it is suffering from serious management problems and infrastructural deficiencies and invites the criticism levelled at agricultural research generally, i.e. absence of communication between research and extension which has resulted in failure to convey research results to the farming community, little or no co-ordination of research at the national level, and no clearly defined or monitored research program. In addition, it suffers from the common MAF ailment of serious overstaffing at the lower levels.

Agriculture and natural resources research is also carried out by the University of Sierra Leone at Njala University College (Agriculture) and Fourah Bay College, where the Institute for Marine Biology and Oceanography (IMBO) is located. Both institutions suffer from lack of resources and policy direction, and absence of linkages to domestic client groups. (The latter more by design in the case of IMBO; by default in the case of NUC).

The ACRE Project, already mentioned in the extension context, was designed primarily to address the deficiencies in applied agriculture (food crop) research and to develop linkages and facilitate two-way communications flow between research and extension. The project is modeled roughly on the U.S. land grant system and jointly implemented by MAF and NUC, with MAF providing funding and NUC providing senior-level research personnel. The project is just beginning to get underway, but does show promise of developing into an active, capable, national applied research coordinating body.

The MNR's Livestock Division research station at Teko and the Forestry Division station at Bumbuna have little impact on the two sub-sectors due to lack of resources, programs and identifiable target groups.

7.3.6 Input Delivery by Institutions

This section considers the delivery of capital inputs and credit to the farmers of Sierra Leone. Traditionally, credit was, and still is, being delivered to a large extent by private moneylenders and other family members. For the few larger-scale commercial producers of crop and livestock products, capital inputs are available for purchase through private business channels. The discussion here is limited to institutional delivery of inputs to the nation's small farm holders.

The MAF has a policy of delivering capital inputs to farmers at subsidized prices. These include improved varieties and plant materials, fertilizers, pesticides, and tillage tools. If the one distribution center visited is typical, the MAF extension service is not presently an effective or efficient delivery system for inputs to farmers. In the facility visited, plant materials were mostly laid out on the floor, open to insects and rodents. The sacked fertilizer observed appeared to be old and moisture damaged. There was no transport to deliver the inputs to the farmers. Records were non-existent. It should be stressed that fertilizer distribution, in particular, is a commercial activity which requires different skills and organizational structure than available through a government ministry.

The MAF also provides tractor plowing services to farmers in certain areas of the country at highly subsidized rates (perhaps one-fourth of real cost). The "Crash Rice Program" for 1980 added 200 tractors to the MAF-owned and operated fleet. (A British ODA-assisted workshop exists primarily to service these tractors). Farmers who actually receive these tractor services benefit substantially from the highly subsidized rates, but their numbers are relatively few, while the potential for misuse and abuse of the tractors is great. There is no satisfactory method for obtaining spares or for insuring adequate programming and controls.

In general, government's function vis-a-vis input supply should be restricted to an advisory and monitoring role, leaving the private sector to distribute and sell, functions at which it is far superior. In addition, the practice of subsidization distorts the economic picture and can breed a serious "dependency mentality" on the part of users, wherein they come to expect and demand continued subsidization as the price for taking actions from which they stand to benefit.

The IADPs deliver a "package" of inputs and credit to project farmers; seeds, fertilizers and tools are supplied in kind, with the value of the inputs extended as credit on concessional (subsidized) terms. Visits to NIADP market centers revealed the existence of a relatively effective input delivery system; adequate supplies of seeds, fertilizer and tools were available at the proper times, and an inventory management plan was in effect. Still, the overhead for this kind of service is very high, the loan repayment record poor, and the problem of subsidies remains. The basic criticisms are equally applicable to the IADPs and the MAF.

Summary. There is no way to estimate the number of farmers reached by inputs delivered by the MAF or IADPs. Estimates of three to ten percent have been made regarding the number of small holders reached by institutional credit. By 1983, when all the existing and presently proposed IADPs are functioning, they are expected to reach 55,000 farmers, or about one out of five (GOSL, p. 32, 1979) for the whole country. Thus, even though the IADPs are clearly the most effective institutions presently existing to deliver farm inputs, they will not be reaching 80 percent of the small-holder farmers in Sierra Leone even if their present plans are fully met. A private sector input supply system, operating within official guidelines, is essential to the efficient dissemination of inputs, including credit, on a country-wide basis. The MAF and projects should seek to foster and support such a system, and rid themselves of the input supply responsibilities as soon as possible.

CHAPTER 8

AGRICULTURAL DEVELOPMENT GOALS FOR SIERRA LEONE

8.1 GOALS AND THE PLANNING PROCESS

Policies are plans of action to attain specific goals within a designated time span. In Sierra Leone, agriculture policies include not only such things as an export tax on cash crops, but also the huge production and investment programs of the IADPs.

The broad goals for which most policy is created and initiated are relatively few; peace, economic development, stability, security, justice and freedom. Sierra Leone, along with all other societies in the world, wishes to have each of these to a certain degree. Some of the goals are competitive for available resources. Some are complementary.

The process of policy formulation must be meaningful in terms of the people's particular needs, their goals, and their resources. An effective policy should also be politically and socially acceptable, administratively feasible, economically sound and amenable to modification as conditions change. These criteria restrict the area for policy decisions and necessitate compromise.

The initial step in planning is to define goals as specifically as possible. At the national level, it is unlikely that Sierra Leone's goals will change much from those stated in the 1975-79 development plan. These are summarized as follows:

1. Preserve political and economic stability as one of the main prerequisites for uninterrupted and continuous economic and social advancement.
2. Attain a higher degree of self-sustained economic growth, since political independence can be made meaningful by achieving economic emancipation.
3. Increase the welfare of the broad mass of the population as the ultimate aim of development, and to that end achieve more equitable distribution of wealth and income.
4. Achieve rapid expansion of productive capacity of the economy to create the basis for an accelerated pace of economic and social progress.
5. Continue and intensify economic cooperation with other African countries, particularly with neighboring West African countries.

The most important national objectives of the first development plan were:

1. Acceleration of the growth of GDP from 4.3 (1963/64-1970/71) to 6.2 percent.

2. Expansion of physical infrastructure -transport, communications, electricity and water.
3. Reorientation and restructuring the educational system in order to maximize its contribution to the economic and social progress of the country.
4. Intensification of efforts to speed up the amelioration of health standards.
5. Expansion of existing services in social welfare, with particular emphasis on assisting community development and self-help projects.
6. Balanced regional development: reduction of regional economic and social disparities.
7. Institutional development including major reform in public administration and establishment of development oriented local government institutions.
8. Administrative reforms to result in increasing the share of public investment in total investment from an average of 24 percent (1963-64 to 1970-71) to 45.6 percent.

8.2 AGRICULTURAL DEVELOPMENT GOALS

In the first five year plan (MDEP, 1975) it was recognized that Sierra Leone's agriculture was relatively underdeveloped and that the majority of the people were and would continue to be farmers. Also highlighted was the fact that rural incomes were considerably below urban levels and that food production was not increasing fast enough to improve per capita consumption levels.

8.2.1 Crop Sub-Sectors

Objectives for the crop sub-sectors in the 1975-79 development plan were listed as follows:

1. To stimulate development from the traditional subsistence type of production to a more productive system of commercial agriculture.
2. To achieve self-sufficiency in staple foodstuffs and other products.
3. To diversify agricultural production with emphasis on food and cash crops in suitable areas.
4. To increase the productivity, incomes and living conditions of the rural population.
5. To maximize foreign exchange earnings through expansion of export crops and import substitution.

6. To increase rural employment through stimulation of private investment in various agricultural enterprises.
7. To improve human nutrition and to conserve the fertility of the soil and other natural resources.

Measures outlined to achieve these objectives included:

1. Increasing crop acreage - primarily inland swamps.
2. Increasing crop yields by providing extension education.
3. Growing more cash crops for the market.
4. Strengthening the agricultural extension service both in quantity and quality.
5. Providing adequate and timely capital farm inputs.
6. Implementing a producer-oriented pricing policy.
7. A phased change over from government owned and operated mechanical cultivation machines to private ownership.
8. Improving crop storage facilities.
9. Sponsoring more problem-oriented research.
10. Strengthening institutional credit.
11. Effecting a more efficient marketing system.

8.2.2 Livestock Sub-Sector

Efficient animal husbandry was to be pursued as an integral part of a sound agricultural system. The goal was to improve livestock through better breeding, nutrition, and disease control.

8.2.3 Fishery Sub-Sector

The goal was to increase fish production to meet domestic requirements and to export the surplus to earn foreign exchange. This was to be accomplished through modernizing the industry, utilizing improved techniques, and providing better infrastructure. Also outlined were plans for a training and extension service and an improved marketing and distribution system.

8.2.4 Forestry Sub-Sector

The objective of the forestry policy was to secure the long range development of forest resources and to increase output through better techniques of timber extraction, increased use of preservation and seasoning processes, and diversification through the development of a rubber industry.

8.2.5 Summary

Nothing has been noted in published writings or in personal conversation that would suggest that the above outlined goals do not remain valid for planning in the 1980's. The PEMSU seminar (May 1980) reconfirmed the importance of the goals and suggested that they could be condensed into three general categories: (1) to increase food crop production, (2) to increase cash crop production, and (3) to improve the quality of life of rural people. The latter would include the objectives of improving nutrition, education, and health. The MNR was not represented in the seminar but conversations with key informants in the Ministry suggest that their goals and objectives for the 1980's have not changed. The general categories outlined above will serve to organize part of the final chapter of this report.

8.3 IMPACT OF VARIOUS POLICIES AND PROGRAMS

When planning specific programs and policies, it must be realized that the impacts are not uniform across the population. A policy to assist the individual farmer (price supports) may impact negatively on the general populace (higher consumer prices or higher taxes). A policy to serve increased government income for public investment by increasing export taxes on cash crops impacts negatively on producers of cash crops by lowering their received prices, thus providing a disincentive for increased production. Timing of programs and impacts also must be considered. Input subsidies to farmers by the government may provide some incentive for farmers to produce more in the short run but result in undersirable factor price distortions for the longer run. Furthermore, it is difficult to remove subsidies once they are incorporated into the system.

Neither does any policy or program designed to help farmers impact equally. The largely subsistence farmer is not helped by a price support program. Farmers with large holdings can usually take greater advantage of any subsidy program than can farmers with small holdings. This is particularly true for subsidized credit as larger farmers have more collateral and pose less risk to the lenders. Such policies may well serve the objective of increased overall production but do little for the impoverished small farm family.

The PEMSU seminar would suggest that Sierra Leoneans are not as concerned over the equitable impact of policies and programs on farmers as is USAID. Current USAID policy is to provide program assistance to the poorer farmers within the total farm group. In the case of Sierra Leone, there is no research that would assist in identifying such a target group. However, in the final chapter, some programs are outlined which are judged to impact on the poorest farmers.

CHAPTER 9

SUMMARIES, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to summarize the major problems and constraints to agricultural development in Sierra Leone and to outline recommendations within the goal structure of the GOSL. The goals used as a basis are those stated in the first development plan (MDEP, 1975) and restated during the seminar discussion on May 29, 1980.

9.1 SUMMARY OF CONSTRAINTS TO AGRICULTURAL DEVELOPMENT

Agricultural development in Sierra Leone has been constrained by the following factors:

1. A low level of government investment in agriculture.
2. The lack of an effective infrastructure to deliver capital inputs and credit to farmers and to market farm products.
3. A monopsonistic buying structure for cash crops which extracts revenue without a corresponding reinvestment in research and extension.
4. The lack of applied research in agriculture and an ineffective extension service.

9.2 SUMMARY OF MAIN PROBLEM AREAS

The constraints listed above pervade the social and economic system of Sierra Leone. The problem areas outlined below are shorter run impediments that can be more easily solved. As such, they form the basis for our recommendations. They include:

1. Lack of a data base for agricultural policy planning and applied research. Data from the 1970-71 agricultural census are still being used as a basis for current estimates of a number of important variables, e.g., the value imputation to subsistence food production in the GDP estimates. For the most important crop, rice, there are no reliable estimates of area planted, area harvested, yields or prices received by farmers. Without this information, agricultural policy making for the rice sub-sector becomes very difficult. No data base at all exists to permit any estimation of the amount or value of crops grown in conjunction with rice on the uplands or in the swamps. A new agricultural census and a system for continuous data collection and processing are badly needed for planning and project design and evaluation purposes.

2. Low rice prices for producers and high labor wage rates that make most rice production systems privately unprofitable and all systems socially unprofitable.
3. Lack of farming technology packages for rice and for relating rice to other crops on the uplands.
4. Low commercialization of rice production.
5. Lack of sufficient incentives to induce cash crop producers to increase production and to deliver the increased production to the SLPMB.
6. Lack of mobility of field workers in the agricultural extension service in both a physical and professional context.
7. Lack of specialists and planning at the upper echelons of the agricultural extension service.
8. Duplication and fragmentation of agricultural extension services among the entities involved.
9. Mistrust of government officials and government programs by many of the nation's farmers.

9.3 SUMMARY OF THE CURRENT DEVELOPMENT STRATEGY: THE IADPs AND PEACE CORPS

In the past five years, a major effort to revitalize Sierra Leone's agriculture and to improve the quality of rural life through the regional Integrated Agricultural Development Projects (IADPs) has been undertaken. The three on-going IADPs are being financed by the World Bank and the European Development Fund.

The IADPs' search for agricultural production packages for domestic foodstuffs and export crops that are technically feasible, socially acceptable, and economically profitable to farmers and to the nation seems to be well-directed. The IADPs take a broad view of the Sierra Leonean farmer and his living conditions (income, education, and health). The IADPs currently in various stages of implementation have already scored a series of partial successes, which include: (1) improving extension services for some farmers (2) providing credit to some farmers, (3) testing a number of new production packages for rice, groundnuts, vegetables, cocoa, and oil palm, (4) providing wells and (5) building feeder roads to facilitate marketing.

On the other hand, the IADPs have come up short on a number of points. They have not stimulated the poorest segment of the farm population to join the projects, nor offered enough complementary services such as clinics, nutrition education, and grain storage facilities.

Another current approach to rural development in Sierra Leone has been the Peace Corps swamp rice program. This scheme has had the positive feature of building grass-roots farmers' associations, but it has suffered from an exclusive concentration on swamps while neglecting upland cultivation. Even more seriously, perhaps, the Peace Corps program has been impeded by the lack of consistent institutional support and of the farm inputs needed for implementation.

9.4 RECOMMENDATIONS: RICE

Given the data constraints under which this assessment was made and the broad goals specified by the GOSL, the following recommendations are made.

Increasing the available food supply is a primary objective of agriculture in Sierra Leone. This goal is expressed in a desire for self-sufficiency in rice production and a wish to improve the nutrition, income level, and quality of life of the rural population.

As the primary food in Sierra Leone, rice has received the greatest attention; total production has increased due to development of inland swamps, utilization of improved cultivation techniques, and reduction of fallow periods on uplands. Additional increases in rice production require:

1. Greater use of improved farming techniques and materials.
2. Continued expansion of high yield areas.
3. Increased incentives for farmers.

Significant increases in production can be obtained through the use of improved varieties appropriate to the various rice production ecologies. These seeds are for the most part available in Sierra Leone and their use should be encouraged.

Improved methods should be emphasized on the uplands because of their large share of national production and area. Fertilizer can significantly increase yields in both uplands and swamps. Its use should be encouraged although subsidies should not be continued. The return to the farmer in increased yield will more than compensate for the cost of fertilizer.

Upland farmers should be encouraged to use land management techniques that reduce fallow periods and permit more than one or two years of cultivation. The expansion of upland farming into marginal (especially hillside) areas should be discouraged.

Increased labor cost has reduced the private profitability of inland swamp development. Labor cost and ecological considerations have similarly reduced the benefits from continued development of mangrove swamps. There is considerable variation in yields in both these areas.

Given the development cost of swamps and present rice prices, yields of inland swamp rice do not generally appear to be sufficient to justify development at this time, except in swamps where double cropping is possible.

Mechanical cultivation should be expanded in the bolilands and riverain areas due to the high return on investment. Subsidies to mechanical cultivation should be eliminated.

For all of these improved technologies to have an effect, a knowledgeable and motivated extension staff and a responsive input delivery system are preconditions.

Land development is costly and some incentive will be necessary to encourage it. Farmers should be provided with development loans to cover increased costs in those swamp areas where double cropping is possible. Extension workers should be available to provide information and necessary inputs at fair market prices. Farmers should not receive subsidized inputs. Timely deliveries of inputs are as important to farmers as price, perhaps more so. Seasonal credit should be made available for the purchase of production inputs.

Rice self-sufficiency will never be achieved unless increased rice production is commercialized. The demand for rice in the subsistence areas is high and increased production will be consumed on the farm if an adequate marketing system is not developed. In order to stimulate increased rice marketing, farmers must receive a fair price for their product. The current farmgate price of Le 7.50 per bushel is too low to cover production and land development costs and return a fair labor income to the farmers. The price should be raised.

The poor bargaining position of the farmer vis-a-vis the commercial rice buyers results in prices being paid that are below the official price, particularly in remote areas. The SLPMB should be willing to take rice at the official price at all times and be provided with the financial and administrative resources to do so. Farmers' associations should be encouraged to construct village rice storages to permit withholding of rice until adequate prices can be obtained. Taxes on imported rice should be raised, or import volume limited, to insure that domestic farm prices can be maintained.

All loan repayments should be accepted in cash or in kind at the official price. The SLPMB or credit institutions should assist in the marketing of these in-kind repayments.

There is no evidence that poor transportation is the reason for low percentages of rice commercialization. As long as farmers have only one potential buyer and are paid a price below the fair cost of production, only a small portion of the crop will be commercialized. It is probable that most of the presently commercialized rice comes from credit repayments (i.e. committed products) rather than from voluntary sales.

9.5 RECOMMENDATIONS: CASH CROPS

Given that a GOSL goal is increased cash crop production, certain recommendations may be made concerning the various crops and potential outcomes may be predicted. These outcomes would be common to the increase of any cash crop for which a world market exists and which is produced in sufficient quantity and quality to be sold on that market. First, increased cash crop production will allow the GOSL to increase foreign exchange earnings in a nominal sense and perhaps in a real sense. Given the projected world market declines in prices of cocoa and coffee in real terms, increased production may be required to maintain Sierra Leone's current position with respect to the real value of exported cash crops.

Second, increased cash crop production should, under proper conditions, result in increased income to the producer. This added income would allow the improvement of family nutrition and quality of life. It would also provide additional capital to the farm family which may, with proper information and incentives, be invested in additional farm production.

Third, increased cash crop production would result in increased tax revenues for the GOSL. If these revenues were invested back into agricultural development it would be possible for the GOSL to increase the size of the tax base, thus generating additional tax revenues.

9.5.1 Coffee and Cocoa

Since coffee is exported as green beans, the major recommendations are in the areas of production and commercialization. Most of these recommendations apply equally to cocoa. In each of these areas, producers need certain information and support if they are to respond as desired.

With respect to production, the producer needs to be made aware of the necessity for and the returns to proper plant husbandry. Extension workers must be able to explain proper pruning and disease control techniques. In the case of cocoa, particular attention should be paid to control of black pod disease. Increased production of both coffee and cocoa also depends on the provision of timely and adequate credit and subsidies. Since producers who rehabilitate coffee stands may expect a decline in production during the first year, the GOSL through SLPMB should consider subsidizing them. Future increases in production should result in increased SLPMB earnings which will offset these shortrun costs. Since existing cocoa stands have limited capacity to respond to rehabilitation, it will be necessary to monitor the cost of and return to any rehabilitation efforts. Projected world market prices indicate a decline in real terms for financial profitability of existing stands. Therefore least cost methods of increasing shortrun output should be identified and a strategy for a phased conversion of old stands to new plantings should be devised. In case of new coffee and cocoa plantings, a credit system must be established which will allow farmers to reach commercial production levels before loans are to be repaid. Farmers must also be assured of tenure on established cocoa and coffee plantings.

With respect to commercialization, coffee and cocoa producers must be informed of the returns they may expect from their efforts. This includes the returns to labor, the world market price and the price,

availability, and expected returns from other production inputs. Economic incentives must also be established and maintained. These include an enforced grading system and payment premiums for higher quality coffee and cocoa.

The following recommendations may be made with respect to both coffee and cocoa. The GOSL/MAF/SLPMB should:

1. Improve the quality and quantity of extension personnel assigned to production.
2. Initiate an applied research program to determine the expected results from the various cultural and disease control alternatives.
3. Encourage the development of a rural banking system to provide needed investment capital.
4. Establish a grading system monitored by SLPMB and begin payment of quality premiums.
5. Develop and enforce a monitoring system to insure that producers receive the posted producer price.
6. Continue to maintain nurseries, since new plantings currently represent the highest long run return to the producer and to the GOSL.
7. Determine the socioeconomic attitudes and objectives of producers with respect to coffee/cocoa production.

Since the cocoa exported by Sierra Leone is in the form of fermented beans, recommendations for cocoa can also be made in the area of processing. Cocoa quality and subsequent price is determined by the quality of the fermentation process at the producer level; therefore, extension workers should inform producers of the advantages of larger batch fermentation and encourage and facilitate group processing. If research proves them feasible, village level fermentation facilities should be developed.

9.5.2 Oil Palm

Oil palm provides both palm oil for domestic consumption and palm kernel for export or subsequent commercial processing. Since the GOSL operates large palm oil mills and purchases palm kernel directly from villages, the pricing structure must be rationalized to insure that mills operate at maximum efficiency. Current high prices for palm kernel should be reduced. It may be necessary to raise mill prices paid for fruit to encourage outgrower sales. Further study is needed to determine appropriate prices. Mill operations should be carefully monitored to insure palm kernels produced meet SLPMB standards.

9.5.3 Ginger

Current SLPMB purchases have resulted in inventories which are not marketable due to low quality. Prices should be reduced or purchases discontinued until quality improves to world standards. Additional ginger planting as suggested in the Magbosi IADP proposal does not seem advisable.

9.5.4 Rubber

Rubber production in Sierra Leone is currently quite limited. World market conditions, however, are projected to be quite favorable. The GOSL/MAF/SLPMB should undertake a program to determine farmer attitudes toward rubber production, capital and credit requirements for rubber production, and processing and marketing procedures suitable for Sierra Leone. Based upon these studies a decision could be made concerning rubber production in Sierra Leone.

9.6 RECOMMENDATIONS: CROPS RESEARCH

High priority has already been given to collecting, processing, and disseminating basic data for Sierra Leone agriculture. Of nearly equal importance is the need for applied agronomic research. The following research needs for crops are listed in order of priority:

1. Upland cultivation systems. Primary effort should be devoted to upland rotation agriculture and multiple and sequenced cropping systems. Technical and economic evaluation should be made simultaneously. The ACRE project can greatly assist in this effort. The uplands will continue to be the source for most of the nation's rice production and there is considerable possibility for increasing yields per unit area. An economic evaluation of the numerous complementary crops associated with rice is needed in order to resolve the "upland vs. swamp rice" debate. Given limited resources, however, it is recommended that priority be given to indigenous legumes, pulses, and oil seeds and other crops that (1) are nutritionally complementary to rice, (2) are relatively efficient yielders in terms of food energy per unit of production energy input, (3) yield products which stimulate "cottage industry" in the production of fermented product foods (agidi for example) and infant weaning foods, and (4) are less demanding on nitrogen fertilizers and controlled water supplies.
2. Coffee and cocoa husbandry. Cash crops are vital to the total economy of Sierra Leone as well as to agriculture. As previously stated, major yield gains are possible by using rather simple improved husbandry practices. A socio-economic study to better understand farmer attitudes towards tree crops is needed as a basis for implementing an effective extension effort. On the technical side, research on improved hybrid varieties, on the control

of blackpod and on desirable plant densities is warranted for cocoa. For coffee, research on pruning techniques has the highest priority.

3. Swamp cultivation systems. In order for Sierra Leone to become either self-sufficient in or an exporter of rice, production increases must come from swamp cultivation. This will require continuing government subsidies unless the present cost-return relationships change significantly in favor of the farmer. Swamps that have the capacity to yield a double or triple crop of rice should get the highest priority on development subsidy monies. As on the uplands, crops that can be sequenced with rice deserve attention. Again, technical and economic evaluations should be made simultaneously.
4. Oil Palm. Palm oil is and will continue to be the major cooking oil used in Sierra Leone. In order to meet domestic needs, production will need to be increased. Projections of oil production at the Daru and Gambia-Mattru mills plus village production leave the country 3000 tons short by 1985 (EIADP, 3). Palm oil imports would have the same negative effects as rice imports on the macro economy of agriculture. Outgrower participation with the present estates must be encouraged by prudent pricing policies for fruit and kernels.
5. New Crops. Several feasibility studies have been completed for Sierra Leone in recent years: citrus fruit, coconuts, rubber and cashews. Rubber appears to hold the best possibility for development.

9.7 RECOMMENDATIONS: EXTENSION AND INSTITUTIONS

It is important to recognize that much good extension work is already being done in Sierra Leone, most but not all of it through the IADP's. Most of its limitations are the result of ineffective policies, inadequate support, and lack of an adequate research base and technical specialists. Future extension approaches/alternatives need to be carefully analyzed relative to the following questions:

1. What are the goals of extension? Goals mentioned during the course of this survey include: the communication of government policy; the achievement of a ratio of extension workers to farmers of 1:300; the improvement of nutrition; the maintenance of the integrity of projects; the strengthening of Njala University College; the improvement and support of extension staff; and the improvement of extension training capacity.
2. Who should do extension education? Institutions currently involved in extension include MAF, MNR, SLPMB, NUC, ACRE, and the IADPs. Rokupr could possibly take a role in extension as well. A confederation of projects to sponsor and administer extension is another possibility.

3. Where are the funds and the talent? The organization that has access to funds for extension has the best opportunity to organize and acquire talented administrators and workers. Can the budgeting process be changed to improve access to funds?
4. What changes are expected to affect extension opportunities substantially? Such changes will be brought by new development projects, new agricultural data and improvement of the country's infrastructure.
5. What will the people accept? Extension always starts with an analysis of the target population - their values, needs, and capabilities.

Keeping these five questions in mind the following recommendations are made.

1. Changes in MAF operating procedures to improve communications and increase involvement and input of all senior staff based in Freetown are needed, e.g., more frequent and substantive senior staff meetings and redistribution of responsibility among the Permanent Secretary and top echelon agricultural officers to more fully employ their skills and experience. This might be accomplished through a working team approach, each member having a major responsibility and all having joint overall responsibility. Examples of major assignments might include research, extension, policy and operations.
2. It is recommended that the Minister take the lead in forming a National Agricultural Advisory Council, to include people who represent the many aspects of agriculture and have a broad perspective of all agriculture. This group should be prestigious, should meet at least quarterly and should be challenged to provide guidelines, resolve differences, and set the overall tone for development and extension efforts. The MAF should undertake a personnel review as soon as possible. Updated job descriptions should be the basis of this review. Redundant personnel should be declared excess so that their salaries can be diverted to the worthy goals of the MAF.
3. The various projects, particularly the IADPs, need to be integrated into the overall Ministry structure and their programs, administrations and resources merged. Otherwise institutionalization and eventual withdrawal of donor support without negatively affecting operations will prove impossible.

4. The IADPs also need to be integrated into the general economy. The IADPs are focused on increasing production. As they are set in place, it will become apparent that the benefits of increased production depend on improved marketing, transportation and communications. The extension service can encourage people to consider future needs and thus facilitate this transition.

Implementing these recommendations will require dedication, commitment and extra work. It can be done.

9.8 RECOMMENDATIONS: PRIMARY PRODUCT PROCESSING AND FOOD STORAGE

Excessive post harvest losses, forced sales of rice at harvest because of lack of storage space, poor food preservation technologies and pests all reduce the amount of food available to rural Sierra Leonean households.

New technologies in food processing and storage must allow for household conditions: the relatively small quantities required, the lack of electrical or fossil fuel energy, and the scarcity of money for capital investment.

It is recommended that support be given to the development of appropriate food preservation and storage technologies. Areas deserving attention include small scale fish drying and smoking units, small scale oil palm presses, palm kernel nut crackers, sawdust as a fuel source, solar driers and cookers for household use, rice storage in villages and households, and improved fermentation procedures for cocoa.

9.9 RECOMMENDATIONS: FISHERIES

As previously stated, the fisheries assessment was limited to small pond fish culture for inland farmers. It is not recommended that Sierra Leone embark upon any investment programs to develop inland farm pond fisheries on a commercial basis. However, the present effort of the Fisheries Division of MNR to help rice farmers develop fish ponds is a useful step towards the goal of improving the quality of life of rural households by improving their nutritional status.

It is recommended that the Makali Fish Station be further developed and that specialized training in fisheries be initiated for selected ATs to work in fisheries extension at the village level. Given the close proximity of the Makali Fish Station to the Makali Extension Training Center, selected students could get first hand experience in fish pond culture while in residence.

9.10 RECOMMENDATIONS: LIVESTOCK

To achieve the stated objectives for livestock, emphasis should be placed on applied research and extension education. Improvements in

animal nutrition and reduction in young animal mortality deserve the greatest attention. These improvements can be substantially met by teaching owners such simple husbandry practices as providing salt and low cost mineral supplements. Improved nutrition will greatly enhance reproductive efficiency as well as foster faster growth rates.

It is recommended that emphasis be placed on animals typically found in villages (goats, sheep, poultry) rather than on developing commercial livestock. Although the ability of Sierra Leone to become self-sufficient in beef is directly dependent on helping the Fullahs to husband and market more livestock, given the objective of helping a larger number of rural people to a better quality of life, the emphasis should be on small ruminants and poultry. Any work on cattle should be confined to indigenous breeds, in which substantial gains may be possible. Money spent on crossbreeding the native N'Dama breed with the Sahiwals at Teko cannot presently be justified in the Sierra Leone context.

It is not recommended that any public support be given to the development of piggeries.

Goats offer more potential than any other animal for providing a complete protein supplement to the diet. The small dwarf goat has less body weight to maintain and is able to subsist on a marginal supply of food and still reproduce. Multiple births could be the rule rather than the exception. Without storage facilities, the smaller animal is also preferred as it can be consumed in a relatively short period of time. Thus, a goat improvement program is recommended as the highest priority in the livestock and poultry area.

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