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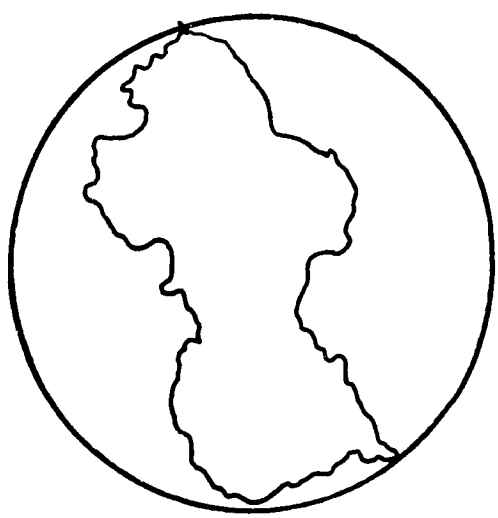
BASELINE STUDY OF AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION IN GUYANA

PREPARED BY
The South-East Consortium for International Development
and Tuskegee Institute



In Cooperation With

THE GUYANESE MINISTRY OF AGRICULTURE
THE GUYANESE MINISTRY OF EDUCATION

Contract AID/LAC-C-1403
June 15, 1981

400 Eastowne Drive • Suite 207 • Chapel Hill • North Carolina 27514

BASELINE STUDY OF AGRICULTURAL RESEARCH, EDUCATION AND EXTENSION IN GUYANA

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The South-East Consortium for International Development
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The Guyanese Ministry of Education
The United States Agency for International Development

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June 15, 1981

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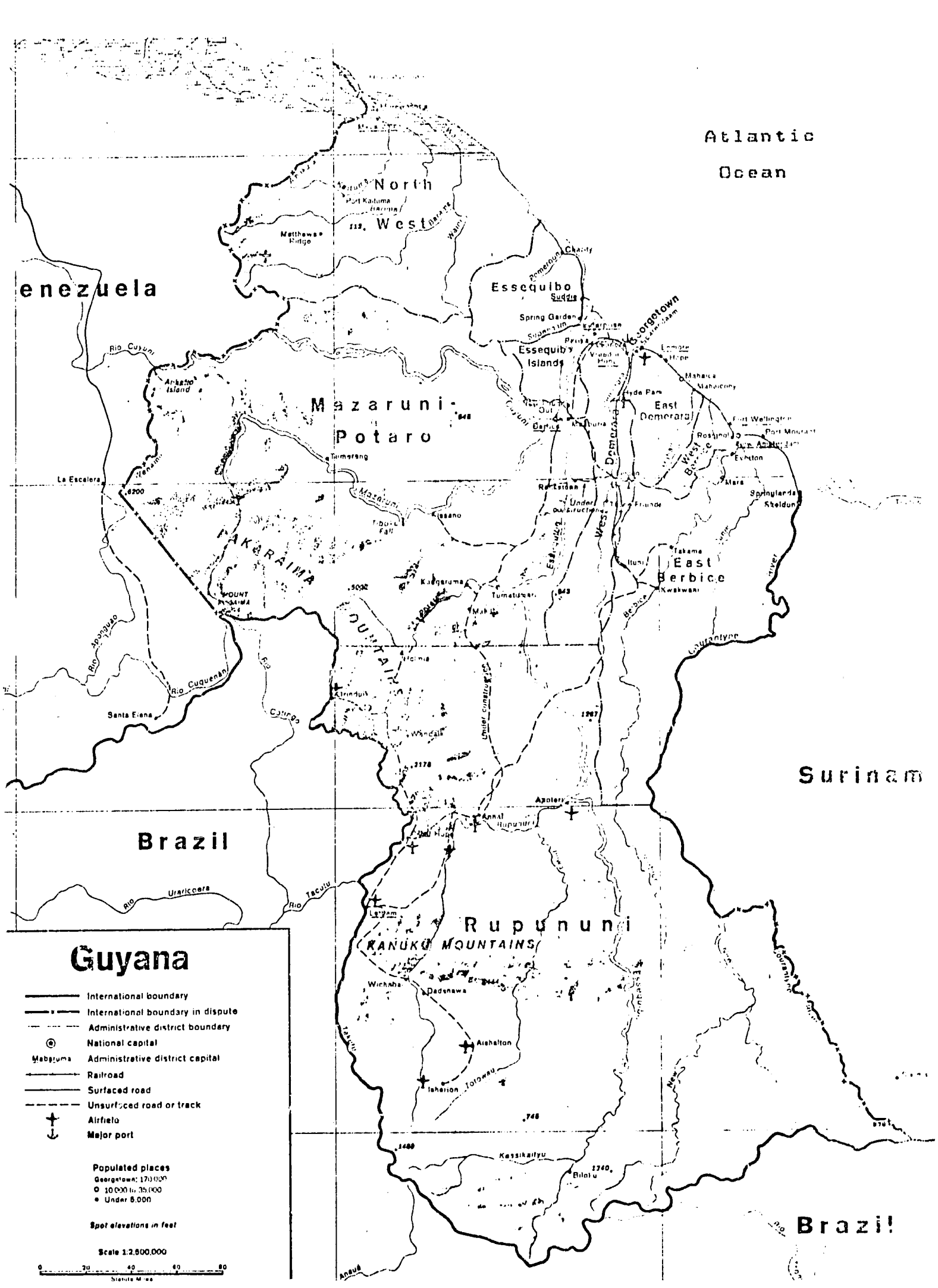
ACRONYMS USED IN THE GUYANA BASELINE STUDY

AFA (Agricultural Field Assistant)
AO (Agricultural Officer)
BAI (Burnham Agricultural Institute)
BIDCO (Bauxite Industrial Development Company)
BIFAD (Board for International Food and Agricultural Development)
BS or BSc (Bachelor of Science)
CARICOM (Caribbean Common Market)
CAS (Central Agricultural Station)
CC (Caribbean Countries)
CDSS (Country Development Strategy Statement)
CIDA (Canadian International Development Agency)
CXC (Caribbean Examination Council)
DSS (Division of Soil Science)
FFA (Future Farmers of America)
FU (Foreign Universities)
FY (Fiscal Year)
GAIBANK (Guyana Cooperative Agricultural & Industrial Bank)
GCE (General Certificate of Education)
GCE O-level (General Certificate of Education, Ordinary-level)
GDP (Gross Domestic Product)
GFL (Guyana Fisheries Limited)
GMC (Guyana Marketing Corporation)
GNS (Guyana National Service)
GOG (Government of Guyana)
GPC (Guyana Pharmaceutical Corporation)
GRB (Guyana Rice Board)
GSA (Guyana School of Agriculture)
GUYSTAC (Guyana State Corporation)
GUYSUCO (Guyana Sugar Corporation)
IDB (Inter-American Development Bank)
IDRC (International Development Research Council)
IRC (International Research Centers)
IRI (International Research Institute)
IRRI (International Rice Research Institute)
LIDCO (Livestock Development Company)
MARDS (Mahaicony-Abary Rice Development Scheme)
MCL (Ministry of Crops and Livestock)
MFI (Ministry of Fisheries)
MID (Ministry of Irrigation and Drainage)
MMA-ADA (Mahaica-Mahaicony-Abary Agricultural Development Authority)
MOA (Ministry of Agriculture)
MOE (Ministry of Education)
MOH (Ministry of Health)
MS or MSc (Masters of Science)
NRC (National Research Center)
NSRC (National Science Research Council)

PAHO (Pen American Health Organization)
PAHO/WHO (Pan American Health Organization/World Health Organization)
PAO (Principal Agricultural Officer)
PD (Planning Department)
PPA (Plant Protection Assistant)
RDPD (Resource Development and Planning Division)
REE (Research, Extension and Education)
REPAHA (Regional Educational Program for Animal Health Assistants)
SAO (Senior Agricultural Officer)
SECID (South-East Consortium for International Development)
TEB (Timber Export Board)
UG (University of Guyana)
UG/FA (University of Guyana / Faculty of Agriculture)
UNDP (United Nations Development Program)
US (United States)
USAID (United States Agency for International Development)
VLS (Division of Veterinary and Livestock Science)

Exchange Rate: $1 (US) = $2.40 (Guyanese)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Spring Garden
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Essequibo Islands
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Upper Essequibo
PAKARAIMA
KANUKU MOUNTAINS
Rupununi
Guyana
Surinam
Brazil
Brazil
Venezuela
Rio Cuyuni
Rio Cuquenan
Rio Apoguao
Rio Uraricoera
Rio Tacutu
Courantyne
Corentyne
Kamarang
Kaieteur Fall
Kaieteur
Kaieteur Plateau
Mount Roraima
Santa Elena
Lethem
Aishalton
Kwakwani
Apoteri
Annai
Kassikaityu
Bilato
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Port Kaituma
Arakaka
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Pomeroon
Supenaam
Abary
Berbice
Courantyne
Corentyne
Kuribrong
Ireng
Takutu
Annai
Rupununi
Guyana
International boundary
International boundary in dispute
Administrative district boundary
National capital
Mabaruma Administrative district capital
Railroad
Surfaced road
Unsurfaced road or track
Airfield
Major port
Populated places
Georgetown: 170,000
10,000 to 35,000
Under 8,000
Spot elevations in feet
Scale 1:2,500,000
0 20 40 60 80
Statute Miles

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PREFACE

The SECID/Tuskegee members of the REE Baseline Study Team held a training session for the Baseline Study Methodology at Tuskegee Institute, Alabama, on January 6, 1981. The training session was conducted by Dr. Glenn Taggart and Mr. Jerry Owens USAID/ BIFAD, Washington, and Dr. Kurt Anschel, an Agricultural Economist from the University of Kentucky, who served as the team leader for a similar Baseline Study in Jamaica and who is now in the process of revising the Baseline Study Field Manual for BIFAD. Dr. Glenn Howze, the team leader for the Guyana Baseline Study, provided the SECID/Tuskegee team with an orientation to the agricultural sector in Guyana.

Dr. Glenn Howze arrived in Georgetown, Guyana on January 9, 1981, and proceeded to organize the study, working with officials from the Ministry of Agriculture and USAID/Georgetown. A detailed scope of work was developed and key REE institutions were identified. With the help of the Ministry of Agriculture, a schedule for visiting the various institutions was established and appointments with key individuals at each of the institutions were made.

A Steering Committee was established to monitor the progress of the study. It was composed of representatives of the key REE institutions, USAID/Georgetown, and the SECID/Tuskegee team. The Steering Committee met several times to review draft documents and to offer suggestions for improvements. The Steering Committee was chaired by Mr. John Browman, Chief Agricultural Officer, Ministry of Crops and Livestock.

SECID/Tuskegee team members were rotated in and out of Guyana from January 9 to February 27, 1981. Team members were provided with detailed scopes of work and assigned to work with counterparts in the Ministry of Agriculture, the Ministry of Education and the State Corporations.

The study team utilized the methodology developed by BIFAD and presented in the Baseline Studies Field Manual.[1] The methodology is designed to provide a comprehensive and standardized analysis of current capacities and development needs for agricultural research, education, and extension systems in LDC's.[2] Past experience with the methodology had indicated that it could not be followed precisely. LDC's vary considerably in their organization and execution of agriculture. This was also true in Guyana and it proved necessary to deviate from the prescribed methodology. The methodology was adapted to fit the agricultural research, education and extension systems which exist in Guyana. However, an attempt was made to follow the outline of the methodology and to present as much of the prescribed quantitative and qualitative data as possible, in order to assure a high degree of comparability with previous studies. The major deviations from the methodology occurred when the requested information was not available and could not be generated in a reasonable time. In addition, an attempt was made to adapt the study to the needs of the Government of Guyana. Thus, the final docu-

ment reflects modifications in the methodology which were made when necessary or when judged appropriate.

With regard to recommendations, an attempt was made to address the development plans of the Government of Guyana, the development strategy of USAID, Georgetown, and the programs of other international donors. They were formulated to articulate specifically with the current and future development programs of Guyana. It was felt that this would maximize their probability for adoption.

The team believes that the study provides a valid and useful analysis of the current REE system in Guyana that can serve as an empirical basis for its modification. Each aspect of the study was reviewed by the Steering Committee. At the conclusion of the study, a seminar was conducted by Dr. Glenn Howze, Team Leader, for appropriate persons from the Ministry of Agriculture, the Ministry of Education, the State Corporations, USAID/Georgetown, and other relevant organizations. A debriefing was also conducted by the team leader for BIFAD and USAID personnel in Washington, D.C.

The SECID/Tuskegee team wishes to express its appreciation to the many people who participated in the study and helped to make it successful. Without their cooperation, the study would not have been possible. The team would like to express special thanks to Mr. John Browman, Theodore Hubbard, Mr. Shakir Hussein and Mr. C. S. Baichoo of the Ministry of Agriculture who provided much of the logistical support for the study. Also, we would like to recognize the important roles played by Mr. Dwight Steen, Mr. Cecil McFarland and Ms. Sylvia Samuels in the Rural Development Office of USAID/Georgetown; they provided both program and logistical support. Finally, we want to note the excellent secretarial and editorial services of several persons. Ms. Cecile Genoud served as the secretary to the study in Georgetown and is to be congratulated for producing a readable copy out of our tortured scribblings. She had the able assistance of Ms. Sandra DaSilva. The final copy was edited with the assistance of Dr. Elsa Liner (SECID). Mr. Bill Sugrue (USAID/LAC/DR/RD), and Ms. Marie Loretan. The Center for Rural Development at Tuskegee Institute produced the final report. The team appreciates the tireless efforts of Ms. Janie Carlisle who typed the report and made all of the editorial changes. Ms. Laurie Morgan, the Office Manager for the Center for Rural Development, supervised the production of the report and was assisted by Mr. Cheickna Singare, Mr. Andrew Tanjong, Mr. Mamadou Keita and Mr. John Howze.

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[1] USAID/BIFAD. Baseline Study Field Manual, US Agency for International Development, Washington, D.C., May 1978.

[2] Previously, there have been Baseline Studies of the REE systems in Jamaica, Yemen, Ecuador, and Peru.

EXECUTIVE SUMMARY

This Baseline Study of the Agricultural Research, Education and Extension (REE) System in the Cooperative Republic of Guyana has been conducted at the specific request of the Ministry of Agriculture (MOA) in anticipation of a major restructuring of the country's agricultural services. Recognizing the importance of research, education and extension to the overall development of agriculture in Guyana, the Government of Guyana is seeking ways to improve the current REE system. Financial support for the study was provided by USAID.

The over-all objective of this study is to improve the agricultural sector of Guyana by providing qualitative and quantitative data which can be used in the redesign of the REE system to make it more efficient in its operation and more responsive to its clientele.

The Baseline Study methodology developed by BIFAD was utilized to conduct the assessment of the REE-system in Guyana. Data were gathered by reviewing documents developed by other study groups, interviewing key officials in the various Ministries and State Corporations and discussing important issues with USAID officials.

A. Key Findings

1. While the national agricultural goal of self-sufficiency in food and fiber and the accompanying production targets for key commodities have been precisely stated and restated in national plans and elsewhere, there has been no systematic attempt to use the REE-system to address this goal and the accompanying production targets.

2. The REE-system is highly fragmented. This is especially true for the research and extension components.

3. There is a lack of trained personnel in each segment of the REE-system.

4. Each segment of the REE-system suffers from a lack of adequate financial support.

5. While lacking insufficient numbers, each segment of the REE-system has well-trained, well-qualified and highly motivated personnel. Unfortunately, these persons are few and typically are assigned to administrative positions, rather than to actual teaching, research or extension.

6. The current system is in flux. This is true for two major reasons. There have been several major Ministry-level reorganizations since independence. In addition, there has been rapid turnover in personnel in key positions within the system.

7. The existing system emerged out of Guyana's colonial past, and institutions often reflect both characteristics and goals of that past.

B. Recommendations

General Recommendation 1

That the current REE structure be reorganized in order to develop an integrated and cooperative REE-system utilizing resources available to the Ministry of Agriculture, Ministry of Education, State Corporations and others as appropriate.

General Recommendation 2

That a competitive salary structure and personnel policies be developed to recruit, maintain and reward competent personnel in the REE programs.

General Recommendation 3

That a transportation infrastructure be developed to permit REE staff to travel, as appropriate, in carrying out duties and responsibilities.

Research Recommendation 1

Develop a comprehensive research plan designed to support effectively national and regional agriculture priorities of increasing production and improvement in the standard of living of the rural population.

Research Recommendation 2

Appropriate research should be conducted and reported prior to implementation of major agricultural production schemes.

Extension Recommendation 1

That the Extension Service be integrated into a single functioning unit. The extension service should be organized to provide general extension services at the farm level with specialized commodity specialists available from national and/or regional centers.

Extension Recommendation 2

That the MOA, through its extension program, in concert with the research divisions, develop technical packages to improve production of key commodities at the producer level (e.g. coconut, edible oils, grain and livestock.)

Extension Recommendation 3

That the extension units establish appropriate linkages with key credit and marketing organizations which have impact on producers at the farm level.

Extension Recommendation 4

That the extension program focus on national and regional agricultural priorities.

Education Recommendation 1

Examine and, when appropriate, redefine the role of agricultural institutions (post-secondary) in providing trained manpower for Guyana (UG, GSA, BAI).

Education Recommendation 2

Improve facilities associated with agricultural education institutions to better serve future needs of Guyana.

Education Recommendation 3

Promote graduate study programs that permit students to conduct thesis research in Guyana or on a project of importance to Guyanese agriculture.

Education Recommendation 4

Provide professional development opportunities whereby Guyanese might be exposed to new methods of addressing problems that limit Guyanese agricultural production.

BASELINE STUDY OF AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION IN GUYANA

CHAPTER I

INTRODUCTION

A. Background of Study

This Baseline Study of the Agricultural Research, Education and Extension (REE) System in the Cooperative Republic of Guyana has been conducted at the specific request of the Ministry of Agriculture (MOA) in anticipation of a major restructuring of the country's agricultural services. Recognizing the importance of research, education and extension to the overall development of agriculture in Guyana, the Government of Guyana is seeking ways to improve the current REE system. Financial support for the study was provided by USAID which contracted with the South East Consortium for International Development (SECID) a consortium of U.S. universities to provide the technical assistance for the study. In turn, SECID contracted with Tuskegee Institute, a member university in Alabama to serve as the lead American institution. The SECID/Tuskegee Team was composed of ten members from Tuskegee Institute, two from Auburn University and one from the University of Maryland. SECID staff provided management and editorial services for the project.

The study was collaborative in nature; that is to say, the study was conducted by the SECID/Tuskegee Team in conjunction with personnel from the Guyanese Ministries of Agriculture and Education. This approach was considered essential in producing a well-designed system tailored to existing conditions in Guyana. Although several members of the team had previous experience in Guyana, the Guyanese agriculturalists possessed an in-depth understanding of their REE system and were able to share this with the American team. On the other hand, the SECID/Tuskegee Institute team members, lacking the vested interests which come with working within the system, were able to analyze the Guyanese REE system objectively. This afforded a "fresh" look at the system and made for recommendations unencumbered with preconceptions. Furthermore, the SECID/Tuskegee team was able to bring its prior experience with another REE system to bear on the analysis of the Guyanese system. Therefore, the collaborative approach provided the means for combining the in-depth knowledge of the Guyanese team with the objectivity and analytical skills of the SECID/Tuskegee team. Hopefully the result can serve as the basis for relevant change in the Guyanese REE system.

B. Objectives of the Study

The over-all objective of this study is to improve the agricultural sector of Guyana by providing qualitative and quantitative data which can be used in the redesign of the REE system to make it more efficient in its operation and more responsive to its clientele. Following the conceptualization formulated by BIFAD for the Baseline Study of REE systems, the study has both general and specific objectives.

1. General Objectives

a) To provide the Government of Guyana (GOG), Ministry of Education (MOE), Ministry of Agriculture (MOA), USAID/ Guyana, BIFAD and other interested parties with relevant detailed quantitative and qualitative data necessary for agricultural planning efforts.

b) To provide an empirical basis for determining the magnitude of the institutional development task faced by the GOG in order to assure the achievement of its agricultural and rural development objectives.

c) To provide a rational basis for:

- determining the priorities for agricultural development programs in Guyana;
- developing a long-term strategy for and approach to bilateral and multidonor assistance for the improvement of the REE system in Guyana;
- identifying the long-term demands which Guyana might be expected to make on Title XII universities and other American institutions in order to achieve its agricultural development.

2. Specific Objectives

a) To produce a qualitative and quantitative assessment of the capacity of Guyanese educational institutions to produce trained manpower for all levels of the agricultural sector, i.e. laborers, managers, technicians, paraprofessionals, professionals, scientists, educators and administrators.

b) To determine the capacity of Guyanese agricultural research institutions:

- to adapt existing technology and develop new appropriate technology for Guyanese agriculture;

- to address issues such as agricultural productivity income levels and distribution patterns in such a way as to generate economic and social information on which to base policy decisions.

c) To assess the capacity of the Guyanese institutional extension structures, both formal and informal, to disseminate relevant technical, economic and social information to the broad range of clientele in the agricultural sector in a timely fashion and in appropriate forms.

d) To assess the coordination of efforts among existing REE institutions, including MOA, MOE, UG-FA, GSA and the state corporations, in the overall agricultural program for Guyana.

e) To determine the magnitude of services which will be required from the REE institutions, if the agricultural and general development goals of Guyana are going to be achieved in the short and medium term.

f) To evaluate the capacity of the REE institutions to provide rural development services vis-a-vis the nation's agricultural development need for such services.

g) To specify both the levels and kinds of investments which will be necessary to eliminate institutional constraints currently preventing the Guyanese REE system from providing the needed services.

h) To identify appropriate mechanisms by which the GOG, USAID, American Title XII universities and other donors might contribute to the development and maintenance of adequate agricultural research, education and extension capacity in Guyana.

C. Division of Labor among Team Members

The REE system in Guyana proved to be highly complex and dispersed among several Ministries and a number of state corporations. The Baseline Study team was large and diverse, selected in terms of subject matter specialities: livestock, home economics, plant pathology, etc. Because of the number of REE institutions involved, the size of the team and the limited amount of in-country time to devote to site visitations, it was impossible for each team member to visit each site in which his/her discipline was involved. Therefore, it was necessary to assign each team member to a limited number of institutions and ask him/ her to review aspects of those institutions other than their speciality. As much as possible an attempt was made to match team members with the institutions which were most concerned with their disciplines. Nevertheless, it was necessary to assign team members to analyze aspects of the institutions they visited which were outside their general area of ex-

pertise. The irrigation and drainage specialist, for example, reviewed extension and research capabilities of organizations that related specifically to agronomy. In each of the institutions surveyed, a key person was identified to serve as a counterpart to the US member of the Baseline Study team. Each team member produced individual reports on each of the institutions which he/she had contacted. These reports served as the basis for the overall analysis of the REE system which is found in Chapter 4 of this report. Separate reports on research, education and extension were compiled by extracting the appropriate information from the individual reports. One person was assigned to summarize education, another research, and the third extension. The Team Leader, with the assistance of the Dean of Applied Sciences at Tuskegee Institute, had the responsibility for formulating recommendations for the study. These recommendations and the accompanying strategies were discussed with key personnel of MOA, MOE and the state corporations. The input from the Guyanese officials was most informed and useful.

The Team Leader with editorial assistance from personnel at SECID had the responsibility for producing the final report and presenting it for approval to officials of GOG and USAID/Guyana. This was done in draft form, and their comments were incorporated into the final draft. The final report was presented to GOG and USAID/Georgetown in a formal debriefing conducted by the Team Leader in Georgetown, Guyana, July, 1981. This was followed by a similar debriefing in Washington, D.C. for BIFAD personnel.

D. Sources of Information for the Study

While the present study is the first to focus on the entire REE system in Guyana, there have been a number of important studies and reviews of its individual components conducted previously. These proved quite helpful. Furthermore, the various agencies in the country regularly publish reports which contain useful statistical and descriptive information. These reports were utilized both as background information for the team members and as a source of material for this report. In addition to useful information about the REE system, these reports often contained recommendations for improvement. Many of these were well-developed and well-founded, and the study team utilized them where appropriate.

Most information for the study was obtained in direct interviews with key personnel in each of the agencies, state corporations and institutions involved in the study. Detailed interview guidelines were developed to assure that relevant information was obtained from each of the organizations. An example of the guide-lines used at the UG-Faculty of Agriculture, is found in Appendix A. Each guide contained the following types of information:

a) List of persons contacted;

b) Organization chart;

c) Description of the development of the current program;

d) Description of major features of the current system;

e) List of major publications;

f) List and evaluation of facilities and equipment;

g) Budget with determination of adequacy of funding;

h) Professional level agricultural personnel by position and training;

i) Vacancies in the organization;

j) Projected personnel needs;

k) Personnel salaries, promotion and professional development;

l) Key linkages with other important agricultural organizations or groups;

m) List of client groups served by the organization;

n) Major strengths and weaknesses of the organization; and

o) Recommendations for improving the organization.

Most interviews were held during site visits to the organizations involved, so that the team members could gain first hand knowledge of the facilities and hold informal interviews with personnel and clients. Quite often, more than one visit to a particular site was required.

Finally, team members held informal talks with large numbers of Guyanese personnel, officials of international agencies, farmers and others. A list of the primary contacts during the survey can be found in Appendix B.

E. Use of the Baseline Methodology

The team attempted to follow the spirit, if not the letter, of the Baseline Methodology. There were a number of items, such as regional analysis and some of the subject matter variables, that made little sense in terms of Guyana. Quite often, information specified by the methodology was not available. In other cases, information obtained for various institutions was not comparable or was for different years.

Nevertheless, an attempt was made to use the methodology and most certainly to provide reasonable answers to the key questions specified by it. In this way, the methodology provided a check list which assured that important aspects of the REE system would receive analysis.

F. Organization of the Report

This report is divided into five chapters. This first chapter provides an introduction to the study and discusses the techniques employed. Chapter 2 provides a brief description of key aspects of the agricultural sector, especially as it relates to the REE system. The third chapter provides a description of the organization of agricultural services and institutions involved in the REE system. Chapter 4 is a lengthy chapter which provides the analysis of the current system. It is divided into three major sections: research, education and extension. The final chapter is composed of recommendations and a strategy for improving the REE system. In addition to these chapters there are several appendices, the most important of which contains brief descriptions of projects which might be funded by international donors to improve the REE system.

CHAPTER II

THE ROLE OF AGRICULTURE IN THE GUYANESE ECONOMY AND ITS IMPACT ON THE REE SYSTEM

Present-day agriculture in Guyana is a legacy of its colonial past. It is an agriculture dominated by the monoculture of sugar and, to a large degree, subject to the capricious behavior of the world market. The business of the colony was sugar, and it was only this crop that experienced deliberate and rational development. Other agriculture was developed in a haphazard fashion primarily by the sugar workers in the back of the estates as subsistance agriculture for their families. With the exception of some commercial rice production this was essentially the situation at the time of independence in 1966. The thrust of the development effort in Guyana since then has been to maintain the strength of sugar production and, at the same time, expand to commercial levels the production of other foods crops, especially rice. The analysis of the REE System in Guyana must be performed in the context of these developments. The particular system that is currently in force is an outgrowth of the colonial experience and reflects the major developments in the agricultural sector which have occurred since independence.

Agriculture in Guyana has also been shaped by the unique geographical characteristics of the country, and by its diverse cultural heritage. The narrow coastal belt proved to be rich agriculturally and relatively easy to exploit. On the other hand, the jungles and savannahs of the interior have proven difficult to develop because of a lack of transporation. Consequently, agriculture primarily takes place on the coast while the rest of the country remains essentially unexploited. Even on the coast, agriculture has not been an easy proposition. It has required the development and maintenance of an elaborate infrastructure for water control to properly irrigate and drain the lands and to protect them from the sea. Mixed with these physical dimensions of development are cultural ones. By and large, the population of Guyana is descended from the African and East Indian populations imported by the British to work the sugar estates. The non-estate agriculture of the country was primarily developed by these groups and reflects their cultures. The development of rice production, for example, was largely due to the fact that this grain was of major importance to the East Indian diet. Over the last hundred and fifty years, the current agricultural production system has emerged in Guyana. The REE system must be judged in terms of how well it serves this agriculture and how well it addresses the problem of the development of Guyana's interior.

A. The Development of Agriculture in Guyana

During the 18th Century the Dutch established an elaborate system of water control, i.e. a sea wall along the coast to keep the salt water off the farm land, and a levee behind the estates to conserve fresh water and provide the irrigation necessary for commercial sugar development. A number of sugar estates were established along the Essequibo, Demerara and Berbice rivers over the next hundred years. Labor for the estates was first imported as slaves from Africa. In 1834, twenty years after the area became a British colony, slavery was abolished, and a large portion of the labor supply left the estates and either moved to the towns or established subsistence farms. Manpower needed for the estates was recruited largely from the Indian subcontinent, as indentured labor. These importations of labor resulted in the current racial and ethnic character of Guyana, where well over 90 percent of the population are either descendants of the African slaves or the Indian workers.

At the time of independence, sugar production was in the hands of two firms, Bookers Sugar Estates Ltd. and Demerara Sugar Estates. These estates were nationalized in the late 1970's, and a state corporation-Guyana Sugar Corporation Ltd. (GUYSUCO) was formed. GUYSUCO now operates ten sugar estates with grinding factories. About 15 percent of the present production is from private cane farmers.[2] Sugar remains the principal crop in Guyana accounting for much of the country's export earnings and providing employment to a large segment of the population.

Rice was introduced to Guyana in the early part of the 18th Century.[3] It was originally grown in kitchen gardens behind the sugar estates. Rice remained primarily a subsistence crop until World War I, when rice from the traditional Asian sources was unavailable on the world market, thus creating a demand from other sources. From that point onward, rice began to play an increasingly important role in the export economy of Guyana. During World War II, the Rice Marketing Board was created and became the sole agent for rice and paddi. It was given the authority to fix both the price paid to farmers and the export price. With independence, the role of the Rice Board has been enhanced giving it increased jurisdiction over the production and marketing of rice. Also, much effort by the government has been devoted to the development of the rice industry. The concern has been to insure domestic food supplies and to increase exports. Several large rice growing schemes involving major capital investments have been sponsored by the government with the assistance of foreign donors. Rice production has always been, and still is, in the hands of small producers. The average farmer produces ten or fewer acres of rice. He typically combines rice production with other crops and livestock.

Other crops and livestock play a less important role in the Guyanese economy. Virtually all of the other agricultural products are consumed locally. Prior to independence, there was no attempt to increase production in crops other than rice and sugar. The agricultural production plans of the colony British Guiana were formulated in terms of the over-

all interests of Great Britain; i.e. the agricultural system in Guyana was only a small part of the total production system of the British Empire. Decisions concerning Guyanese agriculture were made in terms of the overall colonial organization.

With independence, the government faced a new set of problems in the agricultural sector. As an independent country, it had to be concerned with the balance of trade between international imports and exports. Imports of food, fiber and other agricultural products constituted a major drain on foreign exchange. The new government quickly proclaimed the goal of self-sufficiency in food and fiber, and over the following years began to limit severely the importation of agricultural products.

This cut-off in importation of agricultural products and the need to diversify and increase agricultural production for domestic supply and new export opportunities have led to new and increased efforts by government to promote production in a number of crops, including grains, peas, cotton, swine and poultry. The emphasis has been to eliminate agricultural imports either by growing the crops locally or producing acceptable substitutes. Therefore, in the last fifteen years government has fostered agricultural diversification. It should by noted, however, that this has not been done at the expense of the traditional crops, sugar and rice. These crops still receive the major share of attention from both government and the private sector. Thus, while maintaining the primary support for the traditional export crops, the government of post-independence Guyana has moved to strengthen the place of other crops in the agricultural sector.

B. The Role of Agriculuture in the National Development Plan

The last officially approved strategy for national economic development was the "Second Development Plan 1972-75".[4] An unofficial draft of a plan for agricultural development was issued by the Ministry of Economic Development for the years 1978-81.[5] Currently, the Ministry of Agriculture is in the process of writing a new plan. It is worth noting that the development objectives of the Government of Guyana have remained constant since independence. The objectives of the Guyanese development program are stated in the Second plan as:

1. the creation of employment opportunities for all Guyanese;

2. the attainment of an equitable distribution of income;

3. the achievement of an equitable geographical distribution of economic activities;

4. the establishment of the foundation for the attainment of self-sustained economic growth.[6]

While the plan is somewhat out of date, these objectives are apparently still in force in terms of national development strategy. Specific development programs for each economic sector are geared to achieve these objectives. With reference to the agricultural sector, the development programs are being designed to accomplish the following:

1. the achievement of self-sufficiency in commodities for feeding and clothing the nation. This includes providing locally the nutritional requirements of the population at comparatively cheap prices;

2. an appreciable increase in volume and variety and earning power of export commodities;

3. a substantial improvement in the well-being of the rural communities by more equitable distribution of increased sector incomes and services.7

A number of specific development activities have been selected for emphasis in the agricultural sector. These are designed either to reduce the need for particular agricultural imports or to provide increased opportunities for agricultural exports. In addition, other issues such as nutrition, income and employment are addressed. The targets for the agricultural sector are as follows:

1. increased production of commodities for local consumption, specifically such crops as legumes, corn, fluid milk, cotton, edible oil, cassava and vegetables;

2. improvement of nutritional levels;

3. increased production of the traditional export crops, rice and sugar;

4. increased production for export of such commodities as beef, pork, poultry, eggs, fish and fish products, pineapples, plantains, yams, vegetables and citrus;

5. the further development of agro-industrial enterprises, particularly those based on processing of cassava, oil palm, pineapple, citrus, cashew, vegetables and cotton;

6. higher farm incomes throughout the country;

7. the creation of 20,000 new job opportunities in the sector, i.e. in primary agriculture, fishing, agro-industry and ancillary services;

8. the continuation of education of the community as a whole and of the farmers in particular, as to the central importance of agriculture and the dignity of the occupation.8

The preceding objectives and targets have provided the rationale and underpinning of agricultural development in Guyana. It is in the context of these that the REE system must be analyzed and future development programs involving the REE system should be designed.

C. The Demography of Guyana

The last official census of Guyana taken in 1970 reported a population of 701,885. Field work for the 1980 census has been completed, but the data have not been tabulated. Current estimates, however, place the population total in 1980 to be over 800,000. The vast majority of the population (perhaps 90%) lives along the narrow coastal belt which stretches along the Atlantic from the Essequibo to the Correntyne river. It is along this narrow belt that most of the agriculture, especially commercial agriculture, takes place. The rest of the country is essentially undeveloped and unsettled. Only limited agriculture takes place in the hinterlands.

The population of Guyana is relatively young, with 47 percent of it being under 15 years of age. This segment, coupled with three percent of the population who are age 65 years and over, results in 50 percent of the population in age categories which are traditionally considered economically dependent, i.e. persons too young or too old to participate in the labor market. A high dependency ratio, especially one dominated by the young age group, is typical of developing countries.

Relative to other developing areas of the world, Guyana has a low birth rate., i.e. approximately 26 live births per thousand persons compared to 30 to 40 typically found in other parts of South America, Africa and Asia. Also worth noting is the relatively high level of life expectancy in Guyana, i.e. about 68 years, which is not significantly different from the life expectancy in the United States or Europe which is typically in the low or middle 70's. On the other hand, it is substantially higher than the life expectancy of 40 to 50 years which is common in most developing countries. As would be expected, the death rate in Guyana is low, about seven per thousand persons. This is actually lower than most developed countries and is due to the relatively young population in Guyana. Infant mortality is relatively high compared to industrial nations, but low compared to most developing nations, i.e. approximately 50 deaths per 1,000 live births, which reflects the relatively good health services found in the country.

Given the current birth and death rates, the rate of natural increase is 19 per thousand or about 2 percent per year. However, most authorities estimate the actual rate of growth to be about 1.3 percent per year. This lower figure reflects informed estimates about migration patterns which indicate a high rate of out-migration, both legally and illegally. Thus, while Guyana's population is growing, it is not growing at the rapid rate in excess of 2 percent experienced by most developing countries. Population projections resulting from the above fig-

ures have implications for agriculture and agricultural development. If current trends continue there will be over one million people in Guyana by the turn of the century. This increased population will, of course, place greater demands on the agricultural sector.

Whereas most developing countries typically have illiterate populations, with only a small percentage of the population possessing formal education, Guyana's literacy rate is almost 90 percent. Ninety-eight percent of all school age children are enrolled in school; and it is only in the remote hinterlands that one finds limited educational opportunities and low school enrollment. On the one hand, this provides a firm base for development, since the population possesses the educational skills prerequisite for development. On the other hand, however, the high level of education produces frustration and impatience, when the expectation of upper mobility does not materialize due to the slow pace of economic development in the country. Much of the out-migration can be attributed to this situation. Guyana's economy at the present time cannot fully satisfy the increasing demands and rising aspirations of its citizens.

About one third of the country's population is urban, and only about 30 percent of the labor force is employed in agriculture. The remaining population is employed in mining, manufacturing, services and other activities. Thus, unlike many less developed countries, the bulk of the population is non-agricultural, so that the minority that is must produce the excess food necessary to feed the the bulk of the population which is urban. However, it should be noted that it is a common practice in Guyana for persons in non-agricultural occupations to have kitchen gardens and produce at least a portion of their own food. This is especially true of the non-agricultural population living in rural areas.

Finally, the Guyanese population is composed of five ethnic groups. About half of the population is of East Indian descent and is primarily either Hindu or Moslem. About two-fifths of the population is of African descent and is primarily Christian. The remaining population is of Amerindian, European (primarily Portugese), and Chinese descent. Traditionally, the East Indians have played the major role in commercial agricultural production, while the Amerindians are primarily subsistence farmers.

D. Characteristics of Agricultural Producers

In 1978, USAID/Georgetown sponsored a survey of rural farm households.[10] The results from this survey provide the latest and most complete data on farmers in Guyana. Based on a two-stage household survey it was estimated that there were approxmately 24,635 farm households in the country. The survey sample excluded farmers in the hinterlands, with the exception of the North West District. Of course, it also excluded the sugar estates, the farms of the state corporations and other

agricultural endeavours carried out by state corporations, since it was based on farm households only. The authors of the survey speculated that the country had experienced a decrease in the number of farms over the last decade of 3,000 or 4,000 units.11

Table 2.1 shows the number of farms by type of farm. In 1978, 6,635 farms (27 percent) were rice farms; 6,984 (29 percent) food crop farms; 4,146 (17 percent) livestock farms; and 6,700 (27 percent) mixed farms. It should be noted that even farms characterized as rice or livestock farms typically included other farm enterprises such as food crop production for autocomsumption.

Table 2.2 provides data showing the number of farms in various size categories. The median size farm is 7.4 acres, with 40 percent of the farms being less than five acres in size and only two percent having 100 acres or more. Thus, the typical farmer in Guyana farms less than 10 acres and has either a mixed or a rice farm. This is important to note and should be weighed heavily when considering modifications in the REE system. The educational, research and extension programs should be designed to service a small producer. Technology requiring large capital investment is not applicable to the vast majority of Guyanese farmers. This is not to say that the farmers in Guyana currently utilize a low level of technology. The reverse is true. Tractors and other farm machinery are commonplace in Guyana. However, the small farmer typically hires custom work done rather than owning the machines. The REE system should focus on technical packages which can be utilized by small producers.

Table 2.3 provides data showing farm household income by region. The per household income for Guyana in 1978 was G$ 3,404 and the per capita income about G$ 504 (median family size is a little less than seven persons). That income is substantially below the announced goal of the government of a minimum of G$ 6,000 per farm household. There was wide variation by region; West Demerara (G$ 4,691) and East Demerara (G$ 4,432) with the highest, and East Berbice (G$ 2,422) and Northwest and Pomeroon (G$ 2,225) with the lowest income. These data support the point made in the preceding paragraph. Most Guyanese farmers have only limited capital resources and programs and technologies designed to benefit them must take this fact into account. They cannot require major financial investments by farmers.

Table 2.4 shows the number of farms and acreages involved in various crops. Rice is produced by over half of the farmers. About one-fourth of them are involved in each of the following crops: cassava, plantains, banana, vegetables and greens. In terms of area, the household farm survey indicated that there is more acreage in rice than in all other crops combined.

Table 2.5 contains data concerning livestock production. About 30 percent of the producers had some cattle; one-fifth sheep and goats, a little over one-tenth had swine, and over three-fourths had chickens. It should be noted that, typically, each farmer only had a few animals;

TABLE 2.1

NUMBER OF FARMS BY TYPE OF FARMS IN GUYANA, 1978

Type of Farm	No.	%
Rice	6,635	27
Food Crops	6,989	29
Livestock	4,146	17
Mixed	6,700	27
TOTAL	24,470	100

SOURCE: Constructed from Table 28 of the GUYANA RURAL FARM HOUSEHOLD SURVEY conducted by Robert R. Nathan Assoc., Inc. 1980, a copy of which can be found at USAID/Guyana.

TABLE 2.2

SIZE OF FARMS OF GUYANA, 1980

Size of farms in acres	No. of farms	%
less than 2.5 acres	6,252	25
2.5 - 4.9 acres	3,732	15
5 - 9.9 acres	4,936	20
10 - 14.9 acres	3,415	14
15 - 24.9 acres	3,605	15
25 - 49.9 acres	1,609	7
50 - 99.9 acres	704	3
100 - 199.9 acres	278	1
over 200 acres	182	1
TOTAL	24,683	100

Median size of farm: 7.4 acres

SOURCE: Constructed from Table 11 of the GUYANA RURAL FARM HOUSEHOLDS SURVEY, by Robert R. Nathan Associates, Inc., 1980, a copy of of which is found at USAID, Georgetown.

TABLE 2.3

INCOME OF FARM HOUSEHOLDS IN GUYANA BY REGION, 1978

Region	Income per Household (G$)	Income per Capita (G$)
Guyana Total	3,403	504
Northwest and Pomeroon	2,225	379
Essequibo Coast and Islands	3,055	467
West Demerara	4,691	670
East Demerara	4,432	653
West Berbice	3,430	500
East Berbice	2,422	367

SOURCE: Taken from The Income and Production of Guyana Rural Farm Households by Robert R. Nathan Associates, Inc., USAID Contract No. AID-504-INST-281, Table 3-2.e found at USAID/ Guyana.

TABLE 2.4

NUMBER OF FARMS AND ACREAGE BY CROPS

Crop	No. of farms	% Farms	Acreage
Rice	12,638	51	148,017
Sugar	2,368	10	17,681
Corn	1,676	7	5,749
Coconuts	2,861	12	21,691
Cassava	6,176	25	3,590
Eddos	3,820	16	1,419
Yams	868	4	126
Other Ground Provisions	1,664	7	484
Plantain	5,012	20	2,454
Banana	6,780	28	1,339
Citrus	2,764	11	1,938
Pineapple	825	3	1,812
Other Fruit	3,829	16	-
Dry Peas and Beans	1,989	8	133
Peanuts	99	-	55
Tomatoes	3,185	13	306
Cabbage	189	1	31
Vegetables and Greens	6,759	27	1,183
Coffee	1,027	4	1,493

SOURCE: Constructed from Tables 12, 24, 26, 29 and 31 of the GUYANA RURAL SURVEY, by Robert R. Nathan Associates, Inc., 1980 a copy of which can be found at USAID, Georgetown.

TABLE 2.5

NUMBER OF FARMS AND NUMBER OF ANIMALS BY LIVESTOCK TYPE

Livestock stock	No. of farms	% Farms	# Animals
Cattle	7,035	29	67,599
Sheep and Goats	4,451	18	39,942
Swine	2,798	11	28,748
Poultry	18,897	77	515,150

SOURCE: Constructed from Tables 33, 37, 40 and 42 of the GUYANA RURAL FARM SURVEY, by Robert R. Nathan Associates, Inc., 1980, a copy of which is found at USAID, Georgetown.

i.e. livestock was usually combined with other farm enterprises and was very often only for home use. For example, over three-fourths of the farmers who had chickens had less than 25 birds and only 109 farmers (1 percent) had flocks greater than 500 birds.

A relatively high proportion of Guyanese farmers own farm machinery (See Table 2.6). Robert R. Nathan and Associates found that 12 percent of the farmers owned tractors, 13 percent owned boats, 11 percent owned plows and cultivators, and six percent owned cars. Smaller percentages owned trucks, combines, pumps and bulldozers. An important point to note is that, relative to other developing countries, Guyanese farmers are highly mechanized. Most of the farmers who do not own equipment have custom work done by those who do. This fact is interesting considering the relatively small size of landholdings and should be taken into account when development projects are considered. Given the Guyanese experience with modern, sophisticated farm machinery, it may well be difficult to introduce small intermediate technology, in spite of the fact that the relatively small size of landholdings might warrant it. This, of course, presents a challange to the REE system. It must develop ways of efficiently utilizing costly machinery on small holdings.

E. Land Tenure

There are currently three types of land tenure arrangements practiced in Guyana, i.e. freehold (47%), government lease (34%) and private lease (19%). In recent years, new lands that have been opened up to farming by agricultural schemes or hinterland settlement have been largely government lease. While old government leases were for as long as 99 years, new leases are for much shorter periods; in some cases as short as one year. Farmers have been reluctant to make necessary capital improvements on short-term lease land, and this has often resulted in poor land development and poor production. Without some assurance that they will continue to have control over the land, the farmers cannot obtain proper financing from the banks and are unwilling to invest their own resources. In recent years, there has been a movement towards longer leases and assurance of lease continuity.

F. Crop and Livestock Production

Table 2.7 contains data showing crop and livestock production for the years 1976-80. Sugar production was 195,000 long tons in 1976. It increased over the next two years to a high of 324,800 long tons, and then dropped to an estimated 300,000 long tons in 1980. Inasmuch as sugar is the chief agricultural export crop, the government and GUYSUCO have been especially diligent in maintaining the level of production. Since sugar is primarily estate agriculture, GUYSUCO accomplished this by controlling the number of acres brought into production, and the tonnage of sugar cane ground. Sugar is the only agricultural commodity for which this is possible. Rice and other crops are in the hands of

TABLE 2.6

FARM MACHINERY OWNED BY GUYANESE FARMERS

Type of Machine	No. of farms	%	No. of Machines
Cars	1,503	6	1,625
Trucks	680	3	788
Tractors	2,916	12	3,373
Combines	258	1	270
Irrigation Pumps	872	4	904
Boats	3,273	13	4,808
Bulldozers	198	1	207
Plows and Cultivators	2,617	11	4,432

SOURCE: Constructed from Table 45 of the GUYANA RURAL HOUSEHOLDS SURVEY by Robert R. Nathan Associates, Inc., 1980, a copy of which can be found at USAID, Georgetown.

TABLE 2.7

AGRICULTURAL CROP AND LIVESTOCK PRODUCTION IN GUYANA 1976-1980

Crop	in units of	1976	1977	1978	1979	1980*
Sugar	000 L. Tons	195	241.5	324.8	298.3	300
Rice (milled)**	000 L. Tons	210	210	102	137.6	160.9
Coconuts	000 Nuts	32,400	25,200	25,000	26,250	NA
Coffee	000 Lbs.	1,500	NA	2,700	2,700	NA
Citrus	000 Lbs.	22,500	26,000	24,000	22,800	23,500
Ground Provision	000 Lbs.	47,100	54,000	62,100	62,100	64,000
Plantains	000 Lbs.	30,000	43,000	47,000	47,000	48,400
Banana	000 Lbs.	11,000	11,000	14,300	14,300	14,800
Corn	000 Lbs.	9,500	7,200	4,600	3,680	NA
Black-Eye Peas	000 Lbs.	1,600	2,400	3,200	2,880	3,000
Pineapple	000 Lbs.	3,900	4,200	3,600	3,960	4,100
Tomatoes	000 Lbs.	4,100	5,500	6,300	5,985	6,200
Peanuts	000 Lbs.	605	1,160	1,210	1,452	1,500
Cabbage	000 Lbs.	2,600	3,100	2,000	1,800	1,900
Livestock						
Beef	000 Lbs.	8,800	6,900	4,100	3,900	NA
Pork	000 Lbs.	4,900	5,100	3,700	4,000	NA
Poultry	000 Lbs.	20,900	16,900	22,900	23,200	NA
Fish	000 Lbs.	40,000	41,000	32,000	44,000	NA
Shrimps	000 Lbs.	11,500	7,000	7,000	8,000	NA
Eggs	000 dozen	56,300	52,900	32,500	52,000	NA

SOURCE: Planning Department, Ministry of Agriculture, Data Submitted to IDB re Agricultural Sector Loan, January 8, 1981, pages 5, 34, 55, 56, and 60.

*1980 figures are estimates. It was reported that crop-reporting data from the Statistical Bureau of the Ministry of Economic Development was not yet available to the Ministry of Agriculture.

**It should be noted that the data reported in various tables of the report were not always consistent. The authors selected the figures which seemed most consistent with previous production.

private producers and Government lacks the necessary mechanisms to control production.

Rice has not experienced a similar development. Over the last five years, rice production has, except for one year, gone down. In both 1976 and 1977 production of rice was 210 long tons. Over the next two years rice production dropped to 137.9 long tons. There has been much speculation concerning the reasons for the decline in production. A widely held opinion is that farmers have found alternative crops, especially vegetables, to be more profitable. Unlike sugar, rice production is almost totally in the hands of private producers. While government may wish more production, it lacks any effective mechanism to insure it. Given the importance of rice to both domestic diet and export, it is incumbent on the government to formulate incentives to promote increased production. Likewise, it is important for the REE System to formulate strategies and technologies which could prove profitable to the producers. Research is needed to produce higher yields and to reduce costs. Extension packages should be developed to promote better cultural practices.

Coconut production has declined in recent years from a high of over 32 million nuts in 1976 to about 26 million in 1980. Furthermore, it is reported that increasing numbers of coconuts are being marketed as water coconuts rather than as copra for use in the production of edible oil. This has resulted in an increased need for imported edible oil, to the point that the nation is currently importing well over half of its edible oil supply. This situation points to the need to revitalize coconut production and/or to examine alternative sources such as oil palm.

Another crop which showed substantial decrease in production from 1976 to 1979 was corn. In 1976, 9.5 million pounds of corn was produced. This steadily decreased to 3.68 million pounds in 1979. Given the fact that almost all of the animal feed grain in Guyana is currently being imported, this situation deserves review. If corn cannot be economically produced, then an alternative grain crop should be considered. Most certainly, agricultural research in Guyana should be addressing this problem and extension units should be promoting the best available technology. In recent years, the state corporations have been encouraged to produce corn. It was felt that the state corporations had the manpower, land and expertise necessary to expand grain production rapidly. The private sector has largely been ignored. It would be worthwhile to consider promoting grain production among private growers. It was the observation of the Baseline Study team that the agricultural schemes, such as the one for corn production, tend to be inefficient. They are highly subsidized by Government and there seems to be little incentive to make a profit. On the other hand, private farmers are always concerned with profit. Unless they make a profit they are out of business. Using the extension service, Government should encourage private producers to grow needed commodities. Such a strategy could provide the country with the needed commodity and contribute to economic betterment of the farmers.

While citrus and pineapple production remained fairly constant over the five year period, production of coffee, ground provisions, bananas, black-eye peas, tomatoes and peanuts increased dramatically. These are crops which the farmers have found profitable.

Data for the livestock sector are presented for 1976-79. Figures were not available for 1980. The data indicated a dramatic drop in beef production from 8.8 million pounds in 1976 to only 3.9 million pounds in 1979. Much of this is apparently due to a major decrease in the size of the national herd. Farmers are apparently decreasing the size of their herds, because of the problem of cattle rustling. If this trend continues, Guyana may well have to import beef rather than reassume its role of exporter of beef to the Caribbean.

There also has been a decrease in the production of pork; from 4.9 million pounds in 1976 to only four million pounds in 1979. This is largely a reflection of the relatively low price for pork compared to the cost of commercial feeds.

On the other hand, poultry production has increased from 20.9 million pounds in 1976 to 23.3 million pounds in 1979. Based on talks with farmers and livestock specialists, it appears that the poultry enterprise is currently a profitable one in Guyana. With the exception of some variation for a single year, egg production has remained fairly constant over the last few years. The shrimp catch fell from a high of 11.5 million pounds in 1976 to seven million pounds in 1977 and 1978 and rose to eight million pounds in 1979. The fish catch fluctuated between a low of 32 million pounds in 1978 and a high of 44 million pounds in 1979.

The trends in agricultural production, therefore, are mixed. While sugar production has registered major increases, all other important crops have experienced decreases. This trend should be carefully evaluated and remedial action taken where warranted. Once priorities are determined, then the REE system should be used to address the problems and generate solutions.

C. Agriculture and the National Economy

As discussed above, agriculture, especially sugar and rice, have played a major role in the economy of Guyana since early colonial days. Since independence, agriculture has continued to dominate the economy. Therefore, it is important to examine the role that agriculture plays in the national economy; what are the contributions and liabilities of agriculture to the economy?

At the time of independence, Guyana's economy was dualistic. The modern sector was composed of estate sugar production and bauxite mining, and was characterized as being foreign owned, export oriented and using capital intensive technologies. The traditional sector was com-

posed of small agricultural and service industries and its characteristics were low productivity, small capital investments and domestic markets. The major change that has occurred in the economy since independence, has been the nationalization of the modern sector. The sugar estates are administered by the state owned GUYSUCO and the bauxite mining companies by the state owned Bauxite Industrial Development Corporation (BIDCO).

In 1976, the Gross Domestic Product of Guyana(GDP) in current prices was G$ 1,038.4 million (See Table 2.8). In current dollars, the GDP increased to G$ 1,550 million by 1980, or an increase of 49.3 percent over the four-year period. However, when inflation is taken into account, there was actually a decline in the GDP. Table 2.9 presents data showing the GDP in constant dollars. Using 1976 as the base year the GDP showed a decrease from G$ 1,038.4 million to G$ 956.2 million in 1980, or a decrease in real terms of 7.9 percent.

When the GDP is examined by sectors, the data indicate that agriculture (including forestry and fisheries) was the major source of earnings in Guyana for each of the five years. In 1976, agriculture accounted for G$ 289.6 million, or 27.9 percent of the GDP. By 1980, the agricultural sector earned G$ 392 million, an increase of 35.5 percent over the four-year period. However, agriculture's share in the GDP has dropped nine percentage points to 25.6 percent. In constant dollars, the agricultural sector decreased from G$ 289.9 million in 1976 to G$ 242.4 million in 1980, a decrease of 16.4 percent. Agriculture performed more poorly than the economy as a whole.

Sugar made a much larger contribution to the GDP than all other crops combined. However, over the 1976-80 period, there was a significant expansion in the importance of other crops in comparison to sugar. In current dollars, the sugar portion of the GDP increased only 11 percent in the four years, while rice increased 110.2 percent, other crops 84 percent, livestock 72.1 percent, forestry 50 percent and fishing 60 percent. In constant dollars, sugar experienced a decrease of 31.5 percent over the four-year period, while rice increased 29.7 percent, other crops 13.5 percent and livestock 6.2 percent. Forestry and Fisheries experienced small decreases in terms of constant dollars.

Table 2.10 shows exports and imports of goods and services for 1976 to 1980. In each year, sugar and rice combined accounted for over 40 percent of Guyana's exports, following only bauxite in importance. It is interesting to note that over that four-year period, the relative importance of rice increased, while the relative importance of sugar decreased.

Guyana has continually experienced a unfavorable balance of payments with trade deficits ranging from a high of G$ 334 million in 1976 to a low of G$ 52 million in 1978. This, of course, has had an effect on the amount and kinds of products imported into the country. With regard to agriculture, Government has put severe restrictions on imports of food and fiber. Popular food items have been banned, and citizens

TABLE 2.0

SECTORAL ORIGIN OF GROSS DOMESTIC PRODUCT AT CURRENT PRICES, 1976-80
(G$ Million)

Sector	1976	1977	1978	1979	1980	Growth 1976-80
Agriculture, Fishing and Forestry	209.9	247.1	310.5	211.0	353.0	25.5%
Sugar	191.0	104.4	172.1	166.0	212.0	11.0
Rice	29.5	53.2	50.2	40.0	62.0	110.2
Other Crops	25.0	35.3	40.2	42.0	46.0	84.0
Livestock	24.4	26.4	31.5	37.0	42.0	72.1
Forestry	10.0	10.0	11.0	12.0	15.0	50.0
Fishing	10.0	12.8	13.5	14.0	16.0	60.0
Mining & Quarrying	145.0	164.2	171.4	193.0	312.0	115.2
Bauxite & Aluminum	138.0	154.0	162.1	185.0	302.0	118.8
Other	7.0	9.4	9.2	8.0	10.0	42.9
Manufacturing	81.0	85.8	86.0	92.0	110.0	35.8%
Construction	85.0	78.9	75.0	75.0	190.0	123.5%
Government	193.4	200.5	220.0	234.0	260.0	32.0%
Other Services	244.1	230.2	335.0	250.0	280.0	14.7%
TOTAL	1,022.4	1,011.5	1,125.9	1,170	1,550*	49.3%
			(as Percent of Total)			
Agriculture	27.9	24.4	28.3	26.6	25.4	- 9.0%
Mining & Quarrying	14.0	16.2	15.2	16.5	20.1	43.4%
Manufacturing	7.8	8.6	7.6	8.3	7.1	- 9.0%
Construction	8.2	7.6	6.7	6.4	12.3	50.0%
Government	18.6	19.8	20.4	20.0	17.1	- 8.1%
Other Services	23.5	23.4	21.8	22.2	18.1	-23.0%

SOURCE: Table was computed from data contained in Estimates of Current Cost of the Year 1980 as Presented to the National Assembly, Table 1.

*The figure contained in the Estimates document was 1,450. However, when the sector figures for 1980 were added the total was 1,550 million G$.

TABLE 2.9

SECTORAL ORIGIN OF GROSS DOMESTIC PRODUCT AT CONSTANT PRICES 1976=80
(Basis Year 1976)*
(G$ Million)

Sector	1976	1977	1978	1979	1980	Real Growth 76-80
Agriculture, Forestry and Fishing	289.9	223.0	240.7	212.1	242.4	- 16.4
Sugar	191.0	94.2	130.1	113.2	130.8	- 31.5
Rice	29.5	52.5	37.9	27.3	38.3	29.7
Other Crops	25.0	31.9	30.4	28.6	28.4	13.5
Livestock	24.4	23.8	23.8	25.2	25.9	6.2
Forestry	10.0	9.0	8.3	8.2	9.3	- 7.5
Fishing	10.0	11.6	10.2	9.5	9.9	- 1.3
Mining & Quarrying	145.0	148.2	129.6	131.7	192.5	32.7
Bauxite & Aluminum	138.0	139.7	122.5	126.2	186.3	35.0
Other	7.0	8.5	7.0	5.5	6.2	- 11.9
Manufacturing	81.0	78.2	65.0	66.2	67.9	- 16.2
Construction	85.0	69.4	56.7	51.2	117.2	37.9
Government	193.4	181.0	173.8	159.6	163.5	- 15.5
Other	244.1	213.2	195.2	177.4	172.7	- 29.2
TOTAL	1,038.4	912.5	851.0	799.1	959.2	- 7.9

SOURCE: Table was computed from data contained in Estimates, Table 1, and Consumer Price Index information from the Ministry of Economic Development, Statistical Bureau.

*The Statistical Bureau used 1970 as the base year with the Following indexes:

1970 = 100
1971 = 101.7
1972 = 106.7
1973= 117.2
1974 = 140.3
1975 = 148.7
1976 = 161.7
1977 = 179.1
1978 = 214.0
1979 = 237.1

This was converted to make:

1976 = 100
1977 = 110.8
1978 = 132.3
1979 = 146.6
1980 = 162.1
The 1980 rate was estimated using a 10 year average.

TABLE 2.10

EXPORTS AND IMPORTS OF GOODS AND SERVICES, 1976-1980
(G$ Millions)

Exports of Goods & Services	1976	1977	1978	1979	1980
1. Merchandise	712	661	754	737	1,115
a) Sugar	254	185	235	226	310
b) Rice	74	67	96	81	110
c) Bauxite/Aluminum	288	331	332	327	560
d) Other Merchandise	91	78	91	103	135
2. Services	47	46	44	45	45
TOTAL EXPORTS	759	707	798	782	1,160
Imports of Goods & Services					
1. Merchandise	927	804	711	795	1,090
a) Consumer Goods	165	143	121	142	170
b) Fuel & Lubricants	138	160	170	230	290
c) Other Intermediates	312	251	251	267	327
d) Capital Goods	303	226	154	141	196
e) Miscellaneous	9	24	5	5	8
2. Services	166	144	139	187	225
a) Investment Income	61	63	50	77	80
b) Travel & Transport	42	32	28	45	50
c) Insurance	12	11	12	12	13
d) Miscellaneous	51	36	39	53	82
TOTAL IMPORTS	1,093	948	850	972	1,315
Exports minus Imports	-334	-241	-52	-190	-155

SOURCE: Adapted from Estimates of Current and Capital of Guyana for the year 1980, as Presented to the National Assembly, Table 2.

have been encouraged to use local food substitutes. Nevertheless, several agricultural items for which there exist no local substitutes in sufficient quantities are being imported, specifically edible oil, animal feed, milk and cotton. As a result, Government has established agricultural priorities in these crops. It is out of this economic crisis that the current development priorities for agriculture have emerged. Given the current economic situation in Guyana and the prospects for the future, much effort is required to decrease Guyana's dependence on imported agricultural products and increase the exports of key agricultural commodities. Agriculture is certainly one of the keys to solving Guyana's economic problems.

Some might argue that Guyana's current policy of limiting agricultural imports and promoting domestic substitutes is not the best policy. They would reason that Guyana should produce the items that it can efficiently produce and import the rest paying for them with the monies from exports. This solution has not worked well for Guyana. This was the model applied prior to independence when Guyana imported much of its food and fiber. After independence, the economic realities dictated a change. Guyana developed a major foreign exchange problem. The solution was to end non-essential imports. It was determined that Guyana could indeed produce the necessary agricultural products to feed the nation and to greatly reduce imports. This has been the strategy of Government. The problem has been to find suitable alternatives for the items that were imported--yams for potatoes, field peas for English peas, and so forth. Unfortunately, many of the efforts to produce domestic substitutes have been initiated without the necessary research and other inputs from the REE system.

Finally, an additional consequence of the unfavorable balance of payments problem is the limitation it imposes on agricultural inputs. Almost all agricultural inputs are currently imported. Importation of machinery, spare parts, fertilizers, etc. is severely restricted, affecting both public and private agricultural enterprises.

H. The USAID Assistance Strategy for the Development of the Agricultural Sector in Guyana

The over-all USAID assistance strategy, as stated in the FY 1981 Country Development Strategy Statement for Guyana, is to assist the government to overcome the current economic crisis, while at the same time targeting specific help for the poorest segment of the population. In terms of the agricultural sector, the strategy is to continue to support efforts to increase rice production and to fund long-term projects designed to identify alternative agricultural production activities for small farmers. These activities are to take the form of institution building, and will focus on education, research and extension, the REE system. The current Baseline Study, therefore, is central to the design of future USAID projects in Guyana. Mission officials have indicated

that the development objectives found in the FY81 CDSS for Guyana are unchanged. While the FY82 and FY83 Statements were not available officials reported that they contained similar program commitments.

Footnotes for Chapter II

1. Brief histories of the sugar industries in Guyana can be found in three pamphlets: L. A. Hares, The History of Sugar, British Guiana Sugar Producers Association, undated; The Sugar Industry of British Guiana, British Guiana Sugar Producers Association, undated; and, Sugar--Our Main Industry, Bookers Sugar Estates Ltd., undated.

2. Guyana Sugar Corporation Ltd., Reports and Accounts, 1979, p. 7.

3. An excellent history of the development of the rice industry in Guyana can be found in Checchi and Company, RICE II: Second Guyana Rice Modernization Project, Feasibility Study and Report, prepared for USAID/GUYANA, March 1979, Chapter 1.

4. Ministry of Economic Development, Second Development Plan: 1972-76. Georgetown, Guyana.

5. Ministry of Economic Development, Agriculture Development Plan, 1978-81, draft version issued in 1977.

6. Ibid, page 81.

7. Ibid, pp. 2-3.

8. Ibid, pp. 2-3.

9. University of the West Indies, 1970 Population Census of the Commonwealth Caribbean, Kingston, Jamaica, 1973.

10. Robert R. Nathan Associates, Inc., The Income and Production of Guyana Rural Farm Households, prepared for the Ministry of Agriculture, Government of Guyana, under USAID Contract No. AID-504-INST-781, April, 1980.

11. Ibid., p. 4.

12. USAID, FY 1981 Country Development Strategy Statement for Guyana, Department of State, January, 1979, pp. 40, 46, and 47.

CHAPTER III

THE ORGANIZATION OF AGRICULTURAL INSTITUTIONS AND SERVICES

Jurisdiction for the REE System in Guyana is fragmented, authority and responsibility being divided among two Ministries and the State Corporations. Both the Ministry of Education and the Ministry of Agriculture play major roles in agricultural education with MOE being concerned with primary, secondary and tertiary levels and MOA only with the tertiary level. Research and extension activities are carried out by both the Ministry of Agriculture and the State Corporations. At the present time, there is no clear coordination or articulation between the various components of the REE System.

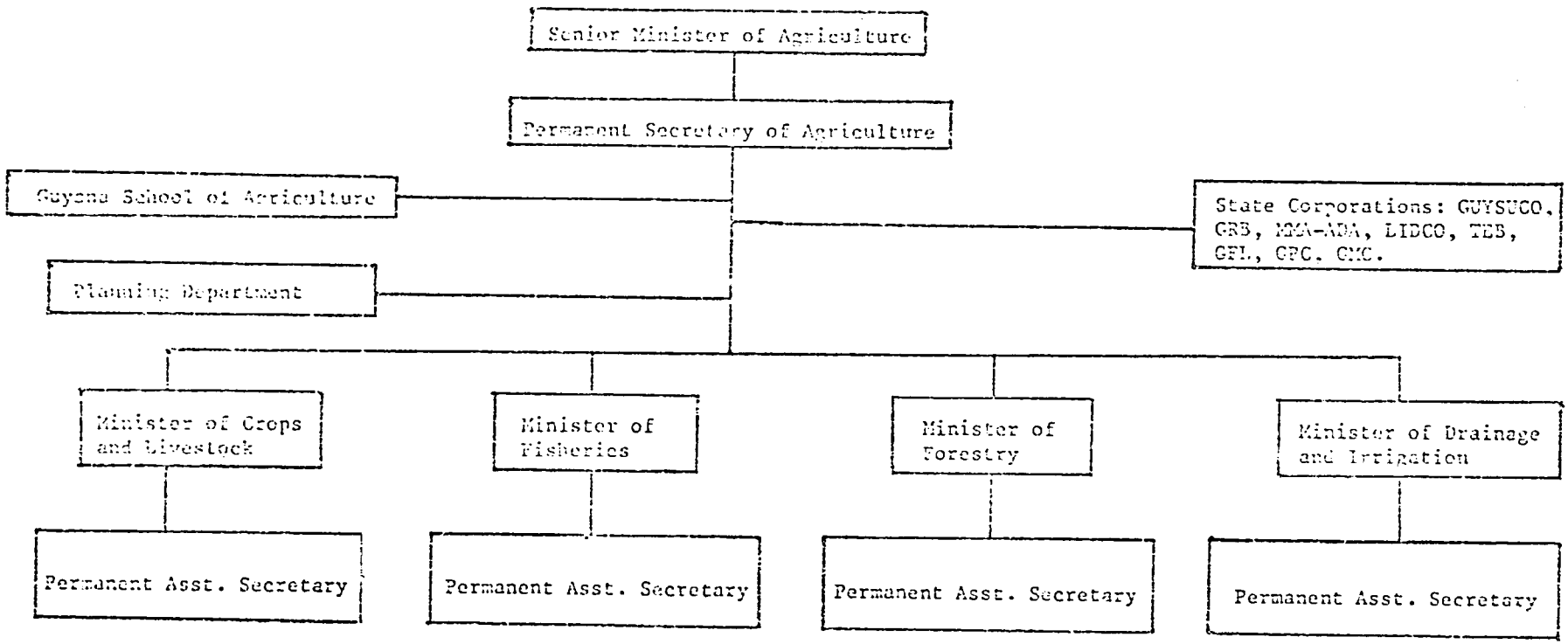
The system has been characterized by change with Ministries routinely undergoing reorganizations and new state corporations being created. The system is still changing and one might expect that portions of the present analysis might well need to be updated as new modifications in the system are made. Everywhere the Baseline Study team went, officials were anticipating major organizational changes. There was no way for this Study to take into account all of the changes that are currently being discussed in the various ministries, educational institutions and state corporations, but the team attempted to anticipate some of the changes when formulating recommendations involving the restructuring of the REE System. Of course, the recommendations themselves suggest a number of major organizational changes.

A. Ministry of Agriculture

At the time of the Baseline Study, the Ministry of Agriculture was undergoing another in a series of major reorganizations. In January 1981, the Government of Guyana initiated a new governmental structure with the chief authority of the country shifting from the office of the Prime Minister to the President. As a part of this change, many of the Ministries, including Agriculture, underwent restructuring. The Ministry of Agriculture was made an umbrella ministry and a Senior Minister was named to head it. Four new ministries were formed and placed under its jurisdiction. Three of the new ministries had been Departments in the previous Ministry of Agriculture--Crops and Livestock, Fisheries, and Drainage and Irrigation. The fourth new ministry established was Forestry. Figure 3.1 illustrates the new organizational structure.

Figure 3.1

NEW ORGANIZATIONAL STRUCTURE OF THE MINISTRY OF AGRICULTURE (Jan. 1981)



The four new Ministries are certainly not equal in size, programs or importance. The Ministry of Crops and Livestock is the largest and best established of the four. It was the largest of the Departments in the old Ministry and received most of the funding and support. The Ministry of Fisheries is by far the weakest of the new Ministries, having only a small staff and a very modest program. The second largest and strongest of the new Ministries is the Ministry of Forestry. It has a relatively large staff and seems to have a well-defined program.

Details of the new organization for the Ministry of Agriculture are still being worked out. However, it appears that there will be a Permanent Secretary of the Ministry of Agriculture and Permanent Assistant Secretaries for each of the new Ministries. It is important to note that lines of authority and communication, as well as jurisdictional matters have not yet been well-defined.

In addition to the four new Ministries, there are other institutions under the jurisdiction of the Ministry of Agriculture. The various State Corporations which are concerned with agriculture are at least nominally under MOA. Also, the planning unit within the Ministry has recently been elevated from divisional status to department status and reports to the Senior Minister through the Permanent Secretary. Finally, there are two post-secondary educational institutions that are administratively under MOA, the Guyana School of Agriculture (GSA) and the Regional Educational Program for Animal Health Assistants (REPAHA).

A point which will become apparent later is that the upgrading of the various Departments--Crops and Livestock, Fisheries, and Drainage and Irrigation--has not resulted in either the expansion of their programs or increases in staff. To the contrary, the programs remain essentially the same and the prospects for additional staff are not promising. Certainly, each of the new Ministries would like to initiate new programs and add additional professional staff. However, given the present financial situation in Guyana one should expect only modest changes. Nevertheless, the Baseline Study team attempted to assess the needs of each of the new units in terms of minimal requirements--a critical mass of professional personnel, logistical support, and scientific equipment--for an effective REE system. If the new Ministries are to function effectively, then provision must be made for these items.

A particular problem with the structure of MOA is the seeming lack of articulation between the various elements of the Ministry. The various Ministries and State Corporations seem to operate independently of each other. Most certainly, they are all responsible to the Minister of Agriculture. However, there is no formal structure which facilitates an interface between the various components on a routine basis. As will be documented in the following chapter, there is significant overlap both in program and clientele among the various Ministries and State Corporations. Some better mechanism for coordination and cooperation is needed. A possible solution would be to establish a Ministry-wide Agricultural Policy Committee composed of chief professionals from each of the sub-Ministries and the State Corporations. The Committee could meet

regularly and deal with matters affecting the entire agricultural sector.

1. The Planning Department

Sector planning in agriculture was originally the responsibility of the Resource Development and Planning Division (RDPD) of MOA. This unit was recently reorganized and placed directly under the Minister. It was upgraded from Divisional status to that of a Department. This development is an outgrowth of a USAID-funded project designed to improve agricultural responsibility for providing planning services to the entire agricultural sector. Figure 3.2 contains the organizational structure for the new PD.

The status of PD is still ill-defined. It is uncertain to what degree it will be able to actually assume the responsibility for planning for the entire agricultural sector. The various State Corporations have, in the past, operated independently of the planning unit. Similarly, various Departments, now Ministries, within MOA had, in the past, superior status to the Planning Division. For PD to function effectively each of the Ministries and State Corporations involved in agriculture must be required to channel its plans and budget requests through this Department. Without this, there can be no centralized planning.

The Chief Agricultural Planner serves as the administrative head of PD and reports to the Senior Minister of Agriculture through the Permanent Secretary. Five Divisions have been established--the Division of Agricultural Economic Research headed by a Principal Agricultural Officer, the Division of Planning and Programming headed by the Senior Agricultural Economist, the Division of Farm Marketing and Trade administered by a Specialist Agricultural Economist, the Division of Statistics with a Principal Agricultural Officer in charge and the Division of Administration headed by an Assistant Secretary.

The stated functions of the Planning Department are:

a. To provide basic resource data and to assemble agricultural statistics;

b. To consult with the State Planning Secretariat and assist in the preparation of National Development Plans;

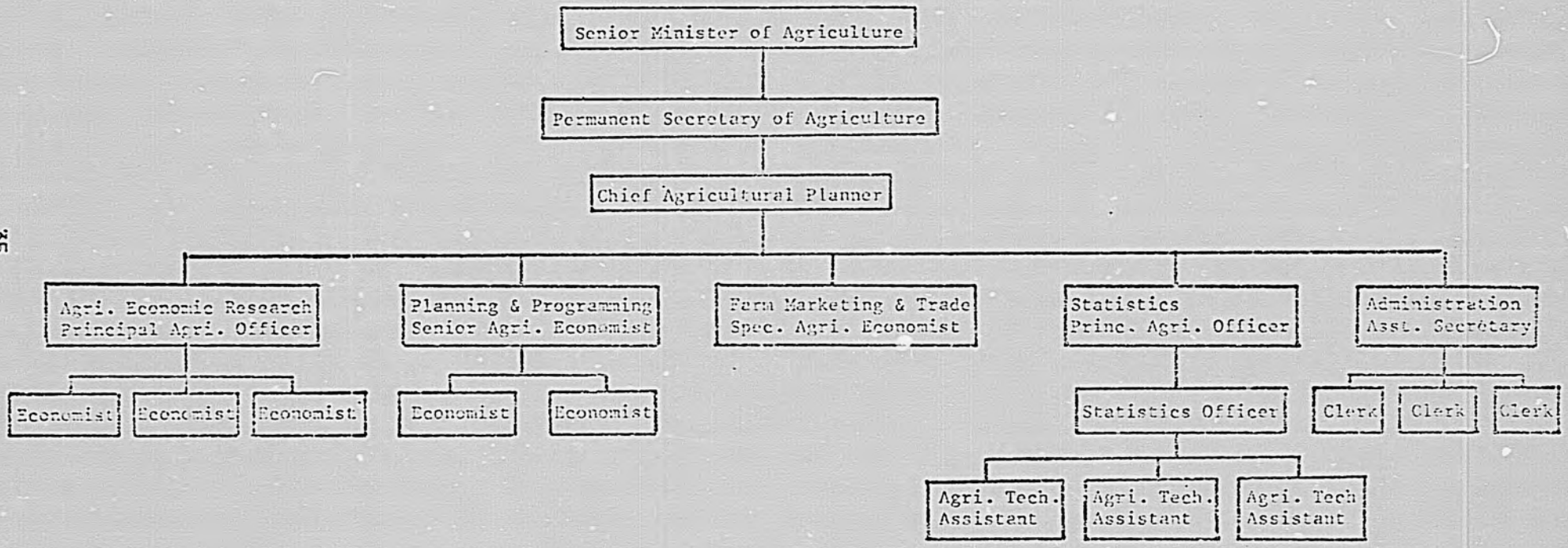
c. To prepare, evaluate and monitor agricultural projects;

d. To initiate and direct economic/agriculture sector research policy analysis;

e. To develop strategies for growth by region, commodity and land use;

Figure 3.2

ORGANIZATIONAL CHART - PLANNING DEPARTMENT OF THE MINISTRY OF AGRICULTURE



f. to maintain liasion with international organizations concerned with agricultural development in Guyana.

2. Ministry of Crops and Livestock

The Ministry of Crops and Livestock (MCL), the largest of the new Ministries, is headed by the Chief Agricultural Officer who is assisted by the Deputy Chief Agricultural Officer. MCL has jurisdiction over all crops, except sugar and rice, and over livestock. MCL is divided into four Divisions: Crop Sciences, Soil Sciences, Veterinary and Livestock Sciences and Extension and Education. The organization for MCL is found in Figure 3.3. The central office for MCL is in the Ministry of Agriculture building in Georgetown. Its four Divisions are headquartered at the Central Agricultural Station (CAS) at Mon Repos.

MCL is responsible for the development and execution of the agricultural program for the country. While MCL is primarily involved in research and extension, it is also responsible for the distribution and sale of key agricultural inputs such as fertilizer, plant protection chemicals, and seed. In addition, MCL produces some of the needed agricultural inputs such as plants, seeds and chemicals. Furthermore, personnel from MCL are responsible for monitoring certain activities such as animal slaughter to insure that health laws and laws governing the slaughtering of female animals are followed.

It should be noted that MCL has thus far experienced fewer problems and unknowns with the recent reorganization than the other new Ministries. It was the major component in the old MOA and had the largest number of employees and the best defined programs. Officials in MCL indicated that the change to Ministerial status has had little effect on its operation or program.

a. Division of Crop Sciences

Figure 3.4 outlines the organization of the Division of Crop Sciences. The Division is headed by a Principal Agricultural Officer. The division is divided into three sections--agronomy, plant protection and seed technology. Each of these sections is headed by a Production Manager. The Division is involved in both basic and applied research. It produces some agricultural inputs and supplies them to farmers. It also performs some extension activities. Its clientele includes farmers and state corporations.

Currently, the major activity of the Seed Technology Section is the production and distribution of certified seed. These activities are being supported with funds from USAID. Regional facilities for seed multiplication are planned with the goal of producing and distributing high quality seed for the major crops of Guyana.

Figure 3.3

ORGANIZATIONAL CHART OF THE MINISTRY OF CROPS AND LIVESTOCK

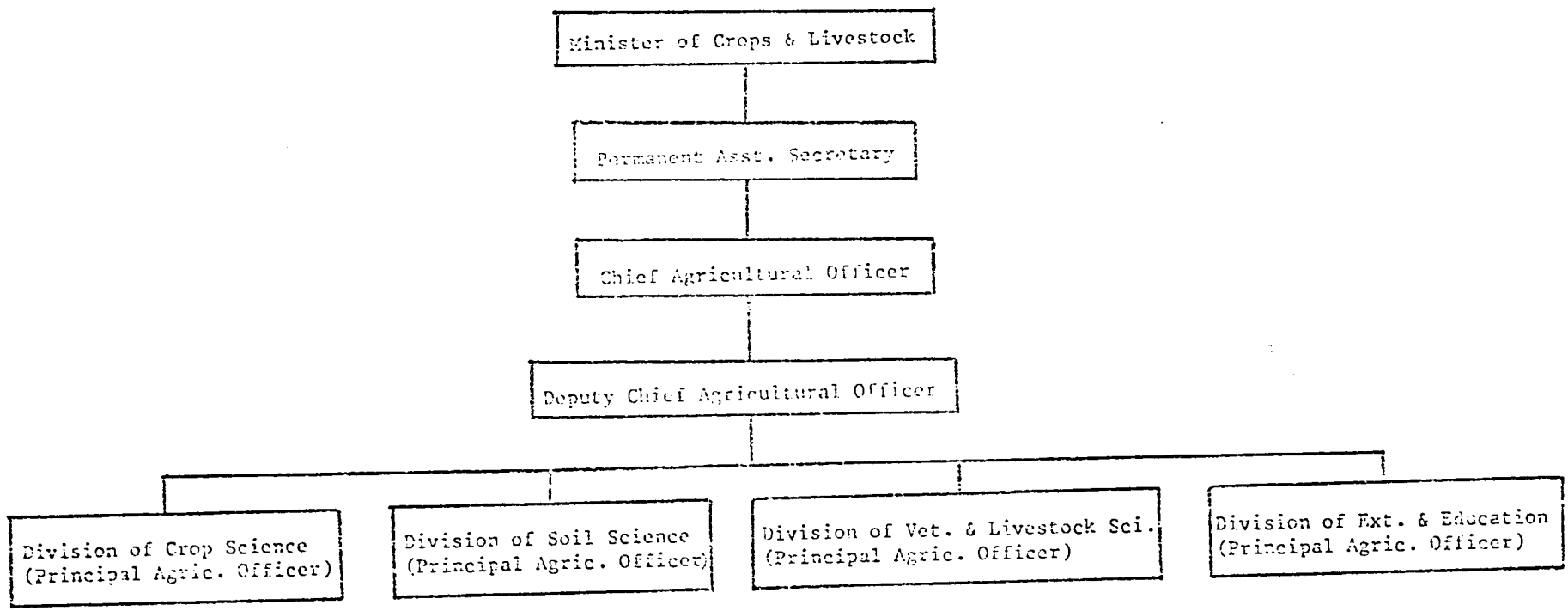
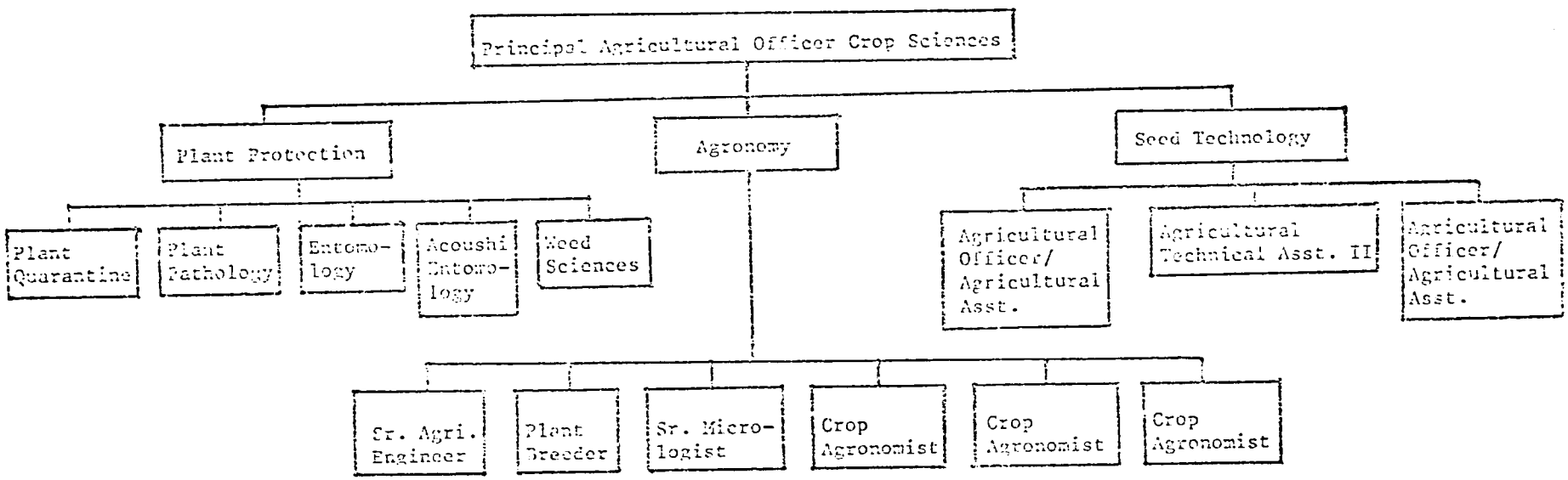


Figure 3.4

ORGANIZATIONAL CHART OF THE DIVISION OF CROP SCIENCES



The Plant Protection Section is further divided into sub-sections --Plant Quarantine, Plant Pathology, Entomology, Accoushi (ant) Entomology and Weed Sciences. This Section formulates and recommends technical packages for plant protection. It also distributes and sells plant protection chemicals. Division personnel in the field serve as extension specialists in the area of plant protection. Typically, this involves operating the commissary where farmers can purchase the chemicals. The Baseline Study team found little evidence that the Division carried out an active extension program for plant protection.

The Agronomy section is primarily concerned with basic and applied research. Personnel in this section conduct a wide range of research testing varieties and production technologies. There seems to be no clear division of labor between the research functions, basic and applied, and the production and other functions of the Division. This is to say, it is difficult to identify who are the researchers and who are the persons involved in seed production, chemical distribution, etc. There is little specialization by personnel. Any given professional is involved in several of the different types of activities conducted by this Division. This matter will be discussed in some detail in the Research Section of the following chapter.

b. Division of Soil Science

In 1975, soil science research was removed from the Division of Crop Science and the Division of Soil Science was established. In the last two years, the Division has undergone major reorganization. The current organization is found in Figure 3.5. The Principal Agricultural Officer heads the Division and key personnel include a soil physicist, soil surveyor and three agri-chemists.

The specific functions of the Division are:

--To execute national soil and land use surveys;

--To make recommendations concerning optimum use of soil resources;

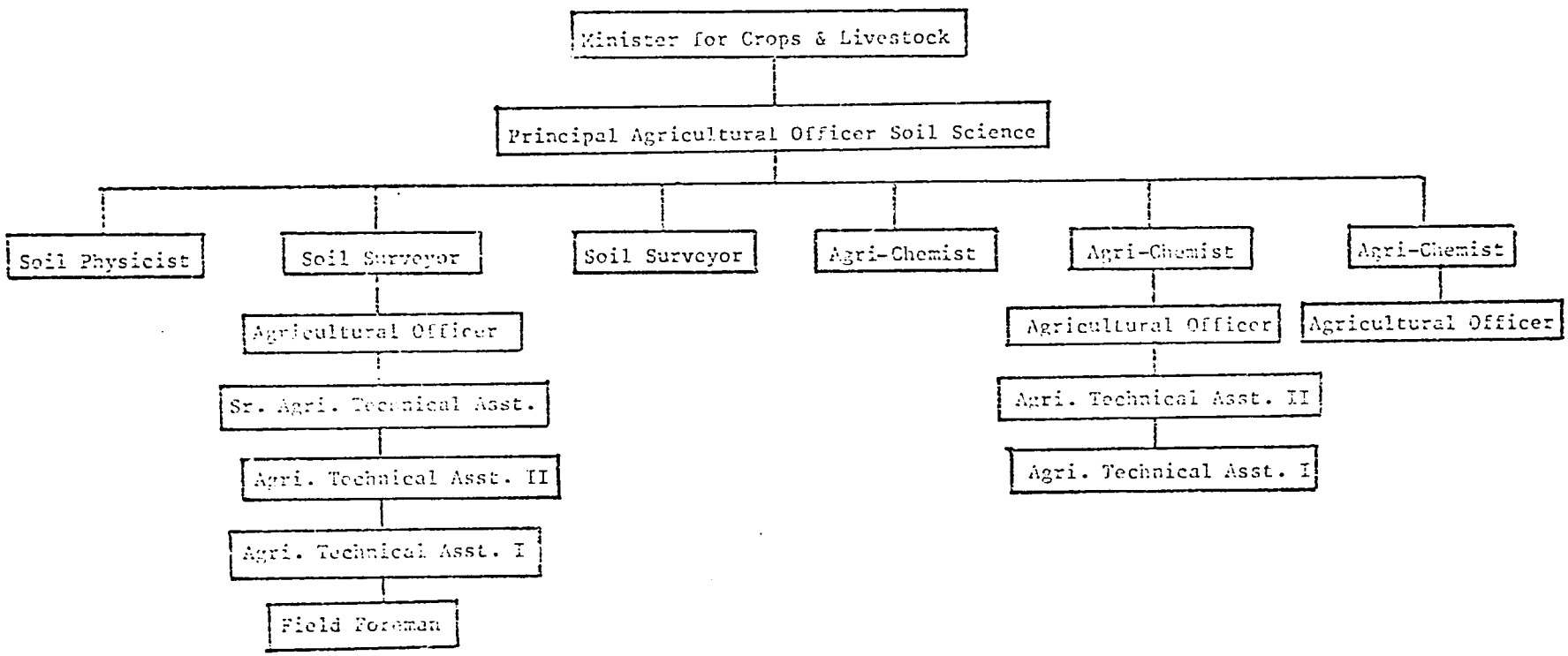
--To provide chemical information on the labile nutrient pool and toxic condition of soil and plant tissue material;

--To provide information on soils of Guyana.

The Division serves farmers, state corporations and the Division of Extension and Education. Its research activities provide the basis for the expansion of agricultural production into savannah and rain forest areas. The soil and plant testing laboratory processes 200 samples per day and makes recommendations for fertilizer and liming rates to farmers and corporate producers. The general impression of the Baseline Study team is that there has recently been substantial improvement in the operation of the testing laboratory. The team heard some criticism from several persons concerning the Division's services. There were com-

Figure 3.5

ORGANIZATIONAL CHART OF THE DIVISION OF SOIL SCIENCE



plaints about the length of time that it took to have samples processed. Recently, however, the PAO has made improvements and there no longer appears to be major delays.

This Division seems to be well organized in terms of personnel and procedures. Nevertheless, there seems to be no clear division of personnel or time in terms of the routine services provided to the farmers, State Corporations and other clients, and the research program. Another way of saying this is that currently there seems to be no clear expectations in terms of service and research outputs. Output goals needs to be established and time and personnel appropriately budgeted.

c. Division of Veterinary and Livestock Science

Until 1973, there were separate Divisions for Veterinary Medicine and Livestock Science, when they were merged into a single Division. The Division is currently headed by a Veterinarian who serves as the Principal Agricultural Officer. Figure 3.6 provides a diagram of the organization for the Division. The Division is divided into two major sections--Veterinary Science and Animal Husbandry. Each of these sections is headed by a Production Manager.

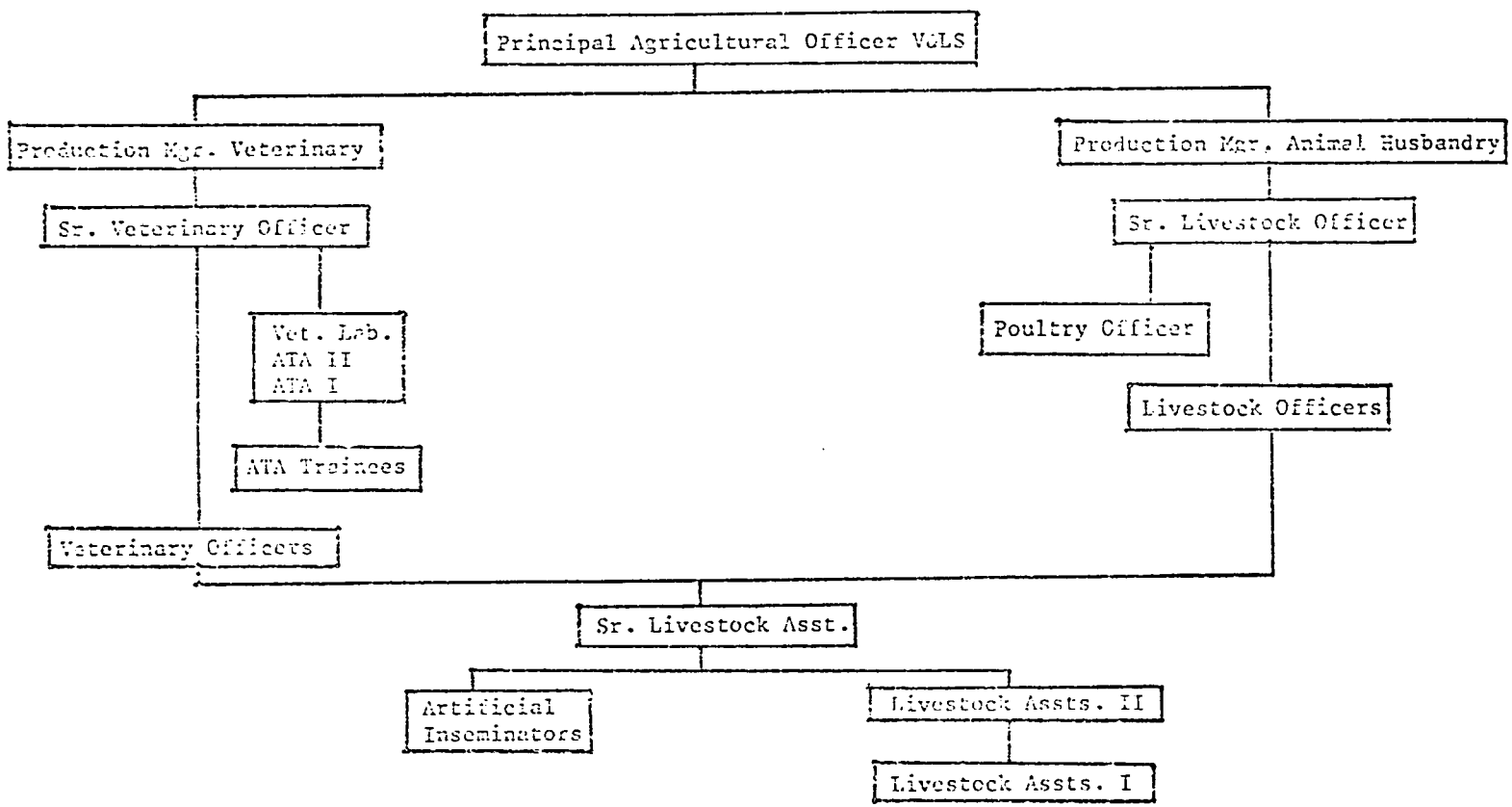
The Veterinary Science section is staffed with Veterinary Officers and Veterinary Assistants and has jurisdiction over animal health. The Animal Husbandry section is headed by a professional in animal science and is staffed with livestock assistants.

The Division has research, extension, production and police responsibilities. The Veterinary section provides medical and other herd health services to farmers and state corporations and supplies the drugs and other veterinary inputs. This section is also responsible for the enforcement of health standards and various laws such as one against the slaughter of productive female cattle. The Veterinary section also operates a Veterinary Diagnostic Laboratory. The Livestock section provides extension services to livestock producers and staffs state farms and research stations such as the one at Ebini in the Immediate Savannahs. As will be noted in some detail in the following chapter, the Division is currently unable to actively pursue a research program and provide only limited extension services. This is due to a chronic lack of trained personnel.

Personnel of this Division are stationed throughout the country, especially in major livestock producing areas. Typically, a Veterinary Officer is in charge of the regional livestock program and supervises several Livestock Assistants and Veterinary Assistants. In this respect, the Division of Veterinary and Livestock Science differs from the Divisions of Crop Science and Soil Science, which have the bulk of their professional level personnel assigned to their Fon Repos headquarters. Like the Division of Extension and Education, this Division provides direct services to producers and thus requires a large field staff.

Figure 3.6

ORGANIZATIONAL CHART - DIVISION OF VETERINARY AND LIVESTOCK SCIENCES



In terms of organization, the major problem with this Division is that it performs too many diverse functions--health, extension, police, research and others. Furthermore, within the organization there is often no clear division of labor with regard to these activities. A Veterinary Officer often practices medicine, performs extension functions, is involved in research, and polices government regulations. What typically happens is that he devotes most of his time and attention to immediate problems and often many important functions go unattended. A similar point can be made for Veterinary Assistants and Livestock Assistants. In this situation the livestock research program has not received much attention in recent years. Also, the Division seems to lack a well-defined extension program. Agents provide services on request but do not seem to have an aggressive program of their own. These problems will be explored in fuller detail in the Research and Extension section of the next chapter.

d. Division of Extension and Education

The largest and most important of the extension organizations in Guyana is the Division of Extension and Education. The Division is headed by the Principal Agricultural Officer. During a recent reorganization, the Division was divided into ten regions (previously there were only six regions) each of which is supposed to be headed by a Senior Agricultural Officer or an Agricultural Officer. Due to a shortage of personnel there are several acting Agricultural Officers and even one Agricultural Field Assistant in charge of a region. Figure 3.7 provides a chart showing the new organization of the Division. In the previous structure, Senior Agricultural Officers were typically in charge of several Agricultural Officers, but now, due to personnel shortages, Senior Agricultural Officers have the same duties as Agricultural Officers, but are usually assigned to larger and more important regions. In addition to the regional offices, there are two additional units at the same organizational level. These are a Communications Section and a Fee Unit, each of which is headed by an Agricultural Officer.

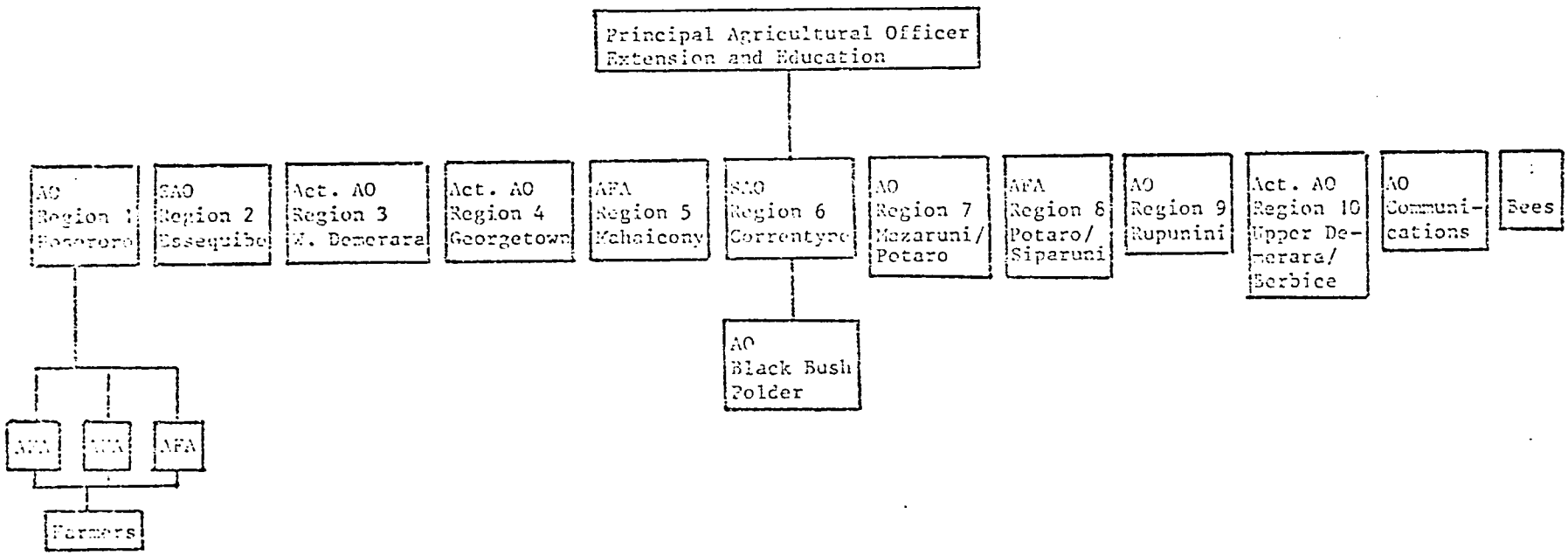
The divisional office at Mon Repos is responsible for formulating the yearly plan of work for the Division and managing the budget. The extension program in recent years has focused on working with agricultural production groups (farmer groups) and promoting increased production in key crops. It should be noted that the Division does not work with either sugar or rice producers. These are the domains of GUYSUCO and GRB. The basic functions for the Division are:

--Promotion of increased production and productivity among farmers;

--Education of farmers utilizing basic extension techniques;

Figure 3.7

ORGANIZATIONAL CHART - MINISTRY OF AGRICULTURE, DIVISION OF EXTENSION AND EDUCATION



Key: SAO = Senior Agricultural Officer
AO = Agricultural Officer
AFA = Agricultural Field Assistant
Act. = Acting

--Organization of agricultural production groups;

--Procurement and sale of needed production inputs to farmers; and,

--Provision of Plant Protection Services.

Each regional office, using the national program as a guideline, formulates its own program. This procedure recognizes the fact that there are important variations in agricultural crops and practices by regions, and it allows the Agricultural Officer for the Region to design specific programs to meet the needs of the area. The Agricultural Officer or Senior Agricultural Officer in each region supervises a staff of Agricultural Field Assistants. It is the Agricultural Field Assistant who has contact with the farmers and extends the program of the Division to them.

With regard to its organization and program, the Division is currently facing a new problem. As an over-all development strategy, the Government is fostering regionalization of government functions. This move is designed to decentralize all government activities, including agricultural extension. As a result, extension programs in the various regions will be administratively under the regional governments. Given this situation, it is important for the Division to reassess its role and jurisdiction. The Division must continue to provide technical assistance to the regional offices. Also, it must insure that the national agricultural priorities and policies are addressed by the regional extension program. In order to accomplish these objectives, the Division must establish a mechanism for gaining the support of regional officials. A solution would be for the regional plan of work for the Division of Extension and Education to require approval from both the Divisional headquarters and the regional government.

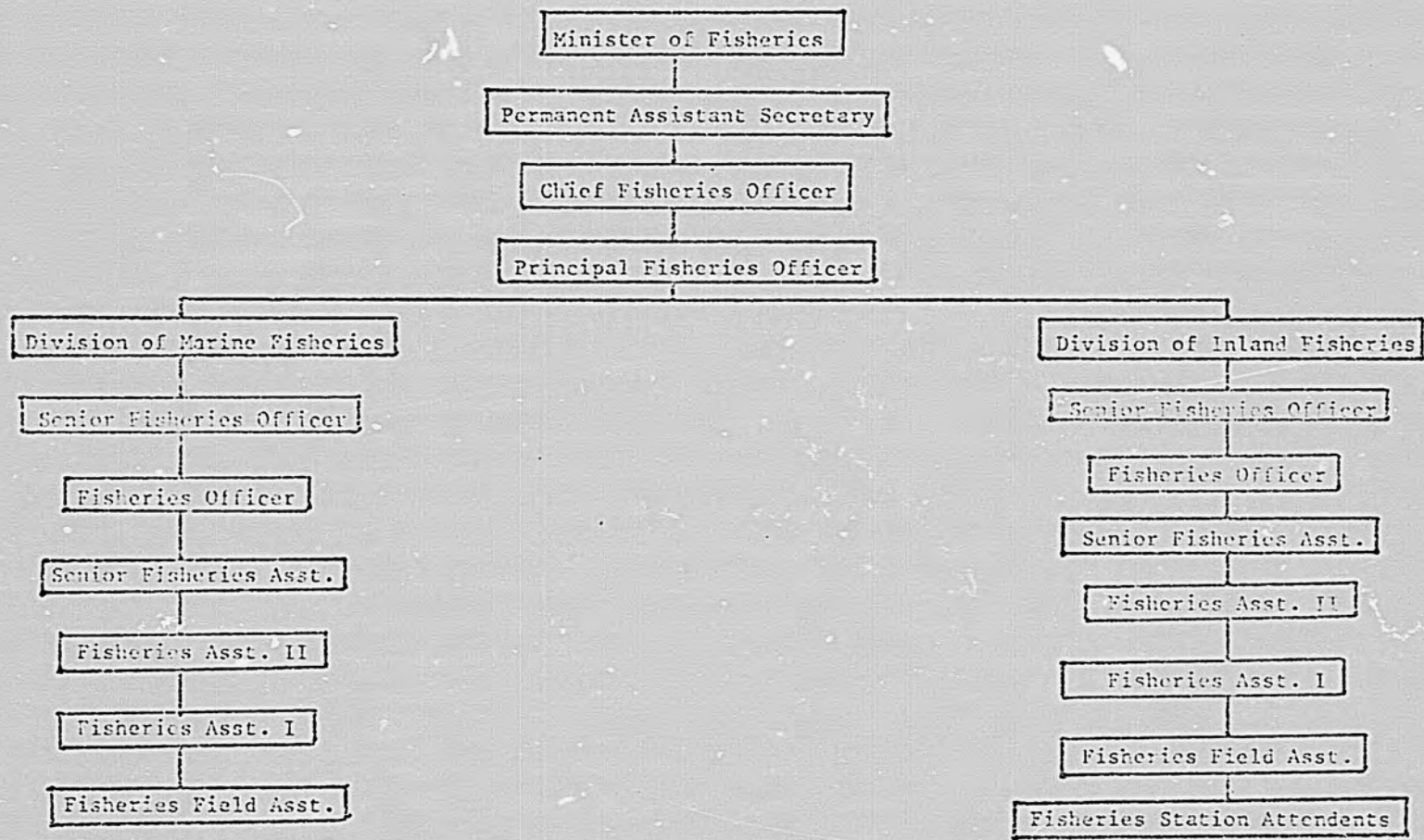
3. Ministry of Fisheries

The Fisheries Department began as a Division of the Ministry of Agriculture in 1948 with the appointment of a Fisheries Officer. Development of artisanal fishermen cooperative societies began in the early 1960's. The brackishwater fish culture station at Onverwagt was built in 1968, followed by construction of the Botanic Gardens facility in 1972. In 1981, the Fisheries Department was elevated to the status of a Ministry. The proposed organizational chart for the new Ministry is found in Figure 3.8.

Interest in shrimp increased in 1972 as greater numbers of foreign shrimp trawlers began to move into Guyanese waters. This increased interest in marine-capture fisheries prompted the appointment of a second Fisheries Officer. Research and extension, as well as marine and inland fisheries responsibilities, were split between the two officers. In 1973, the first Senior Fisheries Officer was appointed and in 1979 the first Principal Fisheries Officer was named.

Figure 3.8

PROPOSED ORGANIZATIONAL CHART FOR THE MINISTRY OF FISHERIES



The major functions of the Ministry of Fisheries are research, extension and regulation. The regulatory activity involves the monitoring of the industry by licensing and registering fishermen. The marine division deals primarily in extension activities carried out with fishermen cooperatives. Results of marine research are also communicated to staff of Guyana Fisheries Ltd. Licenses and registrations of fishermen are monitored and regulated as a means of controlling natural marine stocks. Inland Fisheries responsibilities comprise research and extension activities centered at the Botanic Gardens and Onverwagt Fish Culture stations. The Ministry of Fisheries has also been instrumental in the development of the inland fishery research and production facility at GUYSUCO's Blairmont Estate.

The level of organization, program and development in the Ministry is not very high when compared to the other new Ministries. There are only a handful of professional-level employees in the Ministry and there is currently a lack of well-defined programs for extension and research. The level of activity within the Ministry is not even at the level of a Division within MCL. Government should expand the funding for this Ministry in order to support additional staff and program. Unless this is done, the new Ministry will be unable to develop needed programs and additional services to fishermen. Its new Ministerial status warrants greater financial support.

4. Ministry of Forestry

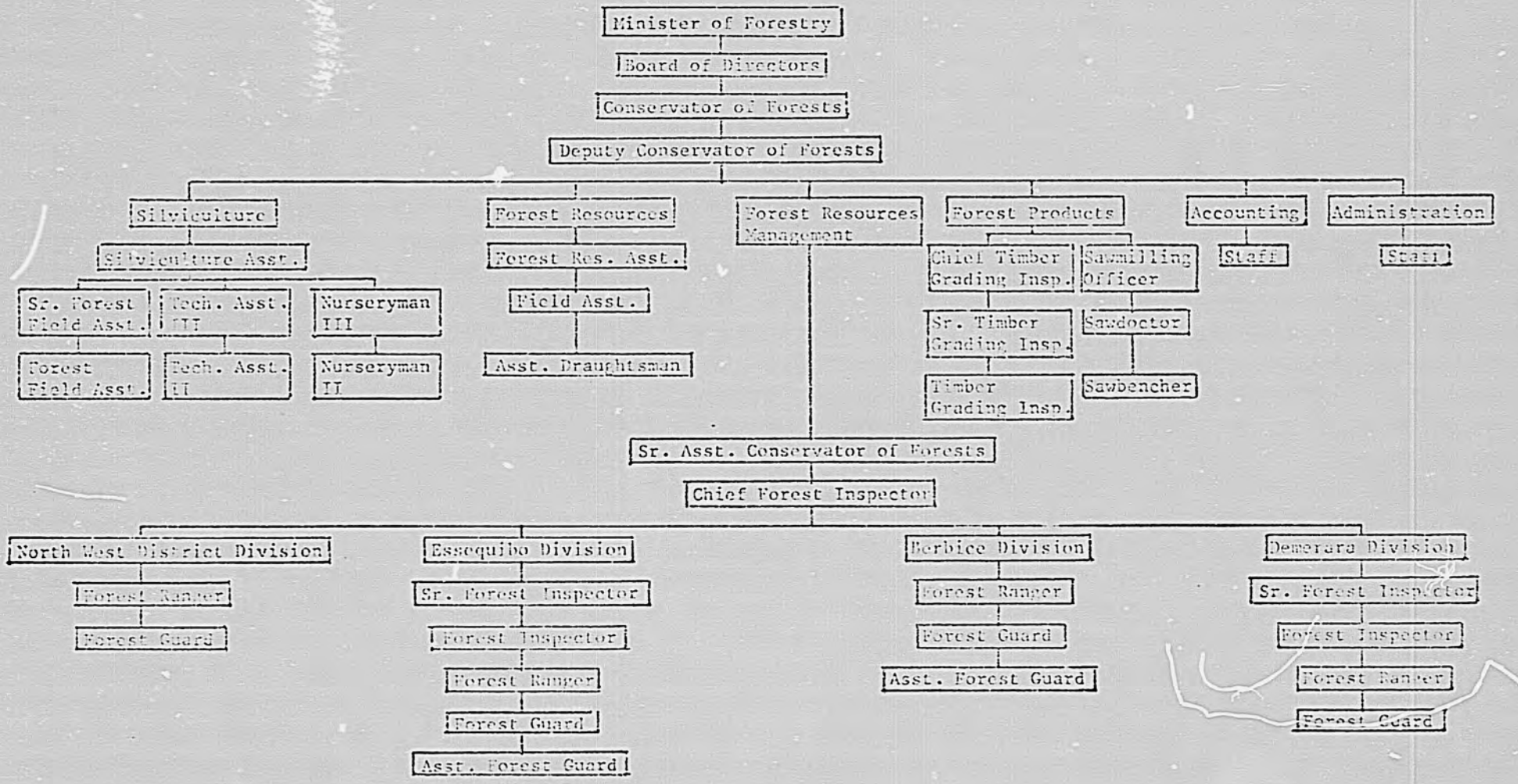
The Forestry Department was created in 1953 as a division of the Ministry of Agriculture. Since that time it has been a division in various ministries--Agriculture, Forests and Mines, Agriculture and Natural Resources and most recently, Energy and Natural Resources. On July 1, 1979, the Forestry Commission was created by the Guyana Forestry Commission Act as an autonomous legal corporation. During the first eighteen months of its existence, the chief executive officer was the Conservator of Forests, who also served as the Chairman of the Board of Directors. On January 1, 1981, a Ministry of Forestry was established and a Minister of Forestry was named. The proposed organization for the new Ministry of Forestry is found in Figure 3.9.

The Conservator of the Forest is still the top professional in the organization and he is assisted by a Deputy Conservator. The major technical divisions are Silviculture, Forest Resources, Forest Resources Management, and Forest Products. Much of the research of the Ministry is conducted by the Silviculture Division. The extension functions are carried out by the Forest Resources Management Division, which is in charge of conserving the forests, and the Forest Products Division which is responsible for the commercialization of forest products.

The primary function of the Forestry Commission is to manage and control the exploitation of the forests of Guyana, which involves making inventories of the forest resources to determine the location, distribution, volume and quality of the most valuable timbers. Control is exer-

Figure 3.9

ORGANIZATIONAL CHART - MINISTRY OF FORESTRY



cised by regulation of the production and marketing of forest produce. The Forestry Commission grants permits to fell and remove timber and to occupy forest lands. It also has responsibility for enforcing conditions of agreement for the sale of timber, timber concessions, forest permissions, licenses and permits. Royalties, rents, stumpage fees and tolls are collected on the timber removed. The Commission also provides a timber inspection service to maintain quality control.

The Commission has responsibility for preparing plans for the development of the forestry industry. These activities include taking inventories, conducting economic studies, mapping and aerial photography. It promotes the use of appropriate timber species and develops timber markets, provides some training for industry personnel, and recommends suitable foreign institutions for forestry training. Guyana's forests are perhaps its greatest natural resource. However, the forestry industry is not well-developed. Compared to some of its neighboring countries, Guyana lags behind. For the industry to develop, the Ministry of Forestry must rapidly expand its programs.

5. Ministry of Drainage and Irrigation

A Division of Drainage and Irrigation was created in 1929 by the Drainage and Irrigation Act. In January of this year, the Division was elevated to the status of a Ministry. The proposed structure of the new Ministry is found in Figure 3.10. The Chief Hydraulic Officer is the highest ranking professional in the Ministry. In addition, he serves as Chairman of the Drainage and Irrigation Board and sits on the Sea Defense Board. The Ministry provides the Secretariat for these Boards and functions as the organizational structure through which projects sponsored by these Boards are implemented. As implied by the name, the Sea Defense Board directs the erection of defenses against damage to roads, communities, farms, and other enterprises, which might occur as a result of high tides.

The Drainage and Irrigation Board designates areas which would benefit from drainage and irrigation and sets fees for construction and maintenance of appropriate structures which are to be collected from the beneficiaries of such works. Agricultural enterprises, communities and industries all benefit from drainage and irrigation projects and each is assessed an appropriate amount of the cost.

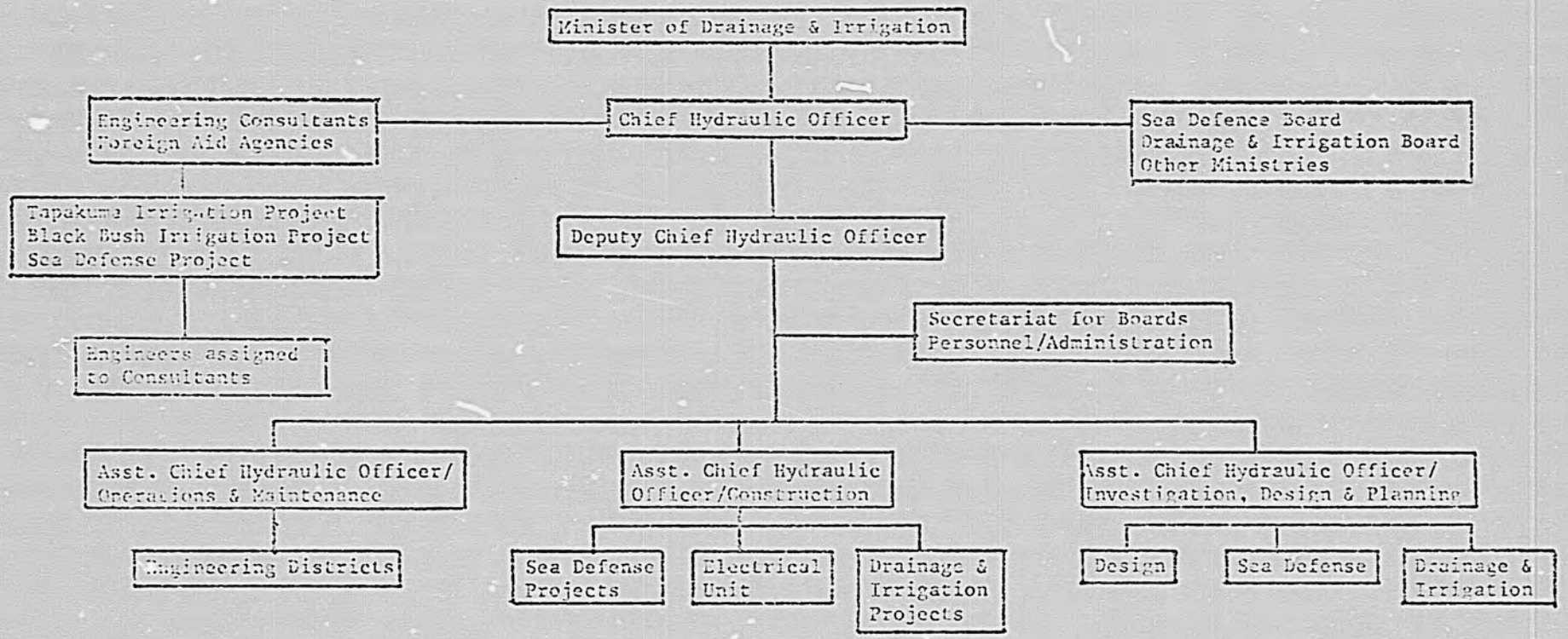
The principal functions of the Ministry itself are:

--Design of hydraulic systems for water management in Declared Sea and River Defense Areas and in Declared Drainage and Irrigation Areas.

--Construction of hydraulic works by force accounts and by local or foreign contractors;

Figure 3.10

ORGANIZATIONAL CHART - MINISTRY OF DRAINAGE AND IRRIGATION



--Approval of consultants' work and facilitation of their operations on behalf of the Government;

--Maintaining a watch on the Declared Sea and River Defense Areas;

--General maintenance and repair of Declared Sea and River Defense Areas;

--Operating and maintaining drainage and irrigation systems;

--Preparing schedules of drainage and irrigation rates and billing the users for these services;

--Providing the Secretariat for the Sea Defense and the Drainage and Irrigation Boards;

--Cleaning and maintaining certain specified rivers and creeks.

6. The Guyana School of Agriculture (GSA)

Under the aegis of MOA, the Guyana School of Agriculture (GSA) was founded in 1963. The school is located at Mon Repos adjacent to the Central Agricultural Station and about eleven miles from Georgetown. It is legally a public corporation with a board appointed by the Minister of Agriculture. The current board is composed of twelve members representing a broad range of agricultural interests and includes high ranking officers from MOA, MOE, GUYSUCO and GRB. Other members include political and community leaders. Having representatives from key agricultural agencies and corporations assures that the educational program at GSA remains responsive to the needs of the country. The Baseline Study team found that, in general, GSA receives very positive evaluations from the major employers of its graduates. Certainly, having key agricultural leaders involved in the governance of GSA helps to improve the quality of the program and to assure the much needed technical and financial support of the major agricultural institutions.

The objectives of the school are as follows:

--to train persons in the theory and practice of agriculture; and

--to manage, develop and operate farms and undertakings of an agricultural nature.

In 1973, the Burnham Agricultural Institute (BAI) was founded at Arakaka in the North West Region of the country and became an affiliate of GSA. It was established to offer a practical training course for persons who wanted to be farmers and settle in the hinterlands.

Figure 3.11 provides an organizational chart for GSA. The Principal is the chief administrative officer for the school and is reponsible to the Board. A Deputy Principal assists the Principal. The next level of organization shows a division between Administration and Academic, each headed by a Principal Lecturer. Under the Administration section are the various support services of the school such as Personnel and Accounting. The Burnham Agricultural Institute (BAI) is also under the Principal Lecturer-Administration. etc. BAI is also administratively under this office. The Principal Lecturer-Technical supervises all of the teachers and other academic personnel at GSA.

7. Regional Educational Program for Animal Health Assistants (REPAHA)

The representatives of the Ministries of Agriculture of the Caribbean at the IV Inter-American meeting on Foot and Mouth Disease and Zoonoses Control meeting in Peru in 1971 expressed interest in the subject of animal health assistants. It urged the various Governments to evaluate the current status of available human resources in Veterinary Medicine and to proceed with the development of training programs for Animal Health and Veterinary Public Health Assistants. At this same meeting, the Caribbean Ministries submitted a request to the Pan American Health Organization (PAHO) to prepare a feasibility study for the establishment of a Regional training program. With the assistance of UNDP, PAHO sponsored a feasibility study that recommended that a regional training center for animal health assistants be established, and Guyana was selected as the site for the school.

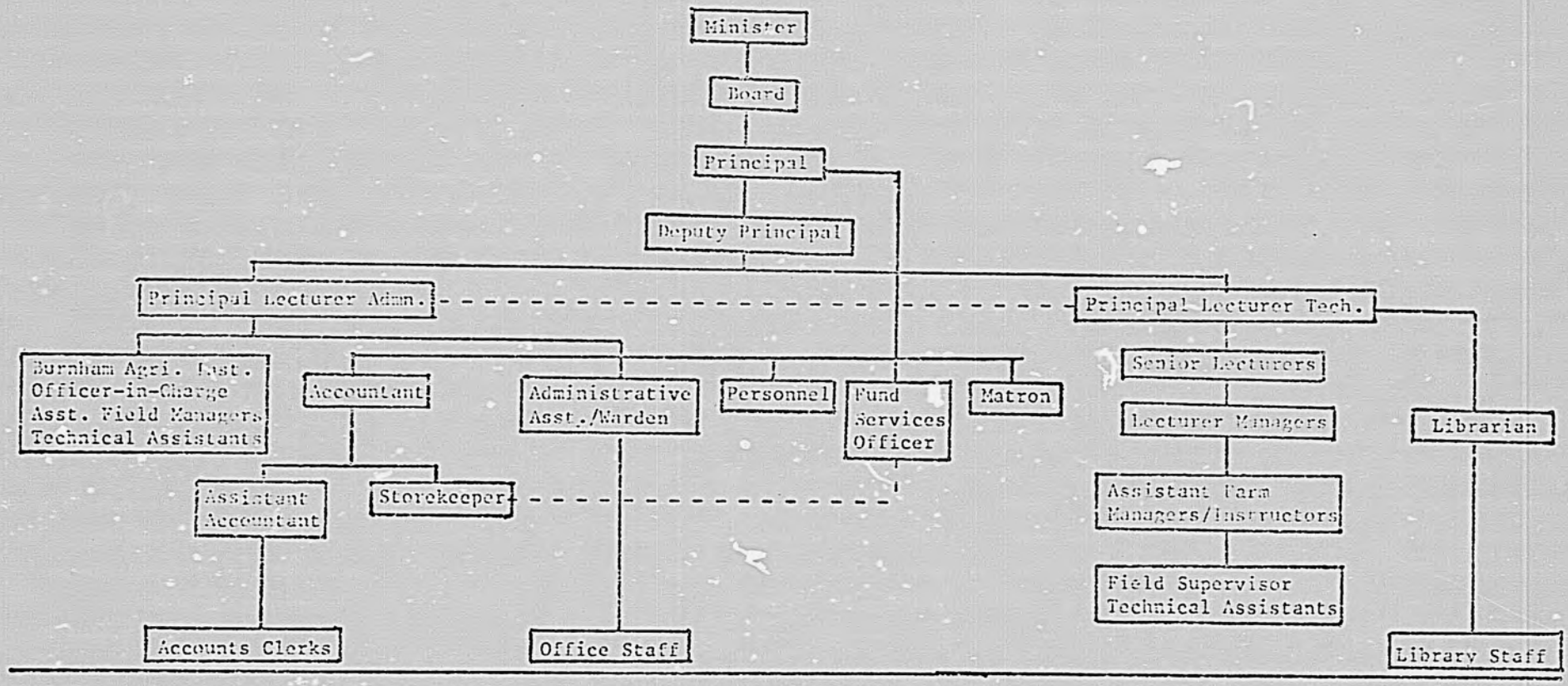
The school was built at the MOA Mon Repos facility which is a few miles outside of Georgetown. The facilities have been built and the program has been established with inputs from Guyana, the other sixteen participating Governments, UNDP, PAHO/WHO, Commonwealth Fund for Technical Cooperation, Canadian International Development Agency and the European Development Fund. The other Caribbean countries participating in REPAHA are: Antigua, Barbados, Bermuda, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Jamaica, Montserrat, Netherlands Antilles, St. Kitts/Nevis/Anguila, St. Lucia, St. Vincent, Surinam and Trinidad and Tobago.

Currently, the school is headed by a Project Manager, who is appointed by PAHO/WHO. (See Figure 3.12) There are two lecturers assigned by PAHO/WHO who have both teaching and administrative responsibilities. The Guyanese Minister of Agriculture appoints a Co-Project Manager/Principal for REPAHA. It is the Co-project Manager who serves as the head of the school and provides the articulation with the "temporary" international faculty provided by PAHO. The contractual agreement funding the school made provision for two counterpart "national" Lecturers. However, due to shortages of professional manpower in Guyana and the other Caribbean countries, these slots are currently vacant. Parttime instructors fill this void.

Figure 3.11

GUYANA SCHOOL OF AGRICULTURE, MON REPOS

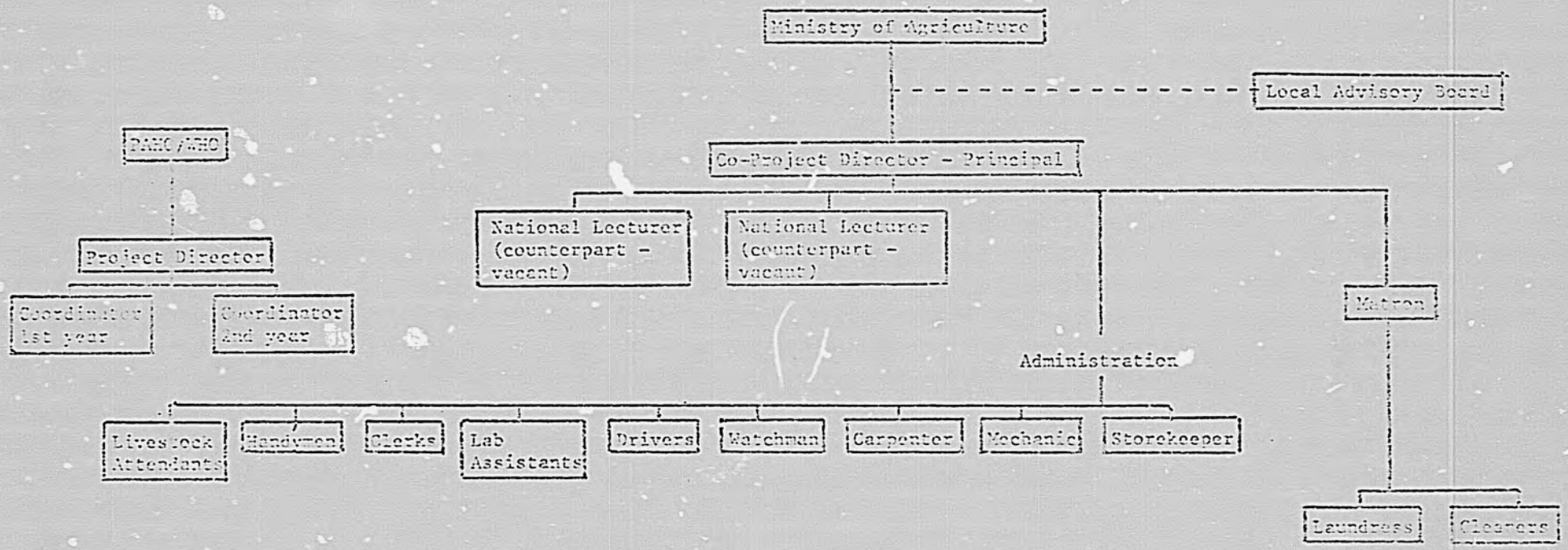
ORGANIZATION CHART



SOURCE: Mr. Winslow Davidson, Principal, Guyana School of Agriculture, Mon Repos

Figure 3.12

ORGANIZATIONAL CHART - REGIONAL EDUCATIONAL PROGRAM FOR ANIMAL HEALTH ASSISTANTS (REPAHA)



It is expected that at the conclusion of the 1984 academic year, there will be a total phase-out of the support currently given by COG and PAHO/WHO. At that time, an Advisory Board with members from the participating countries will be established and will constitute the governing body for REPAHA. This will be a crucial point in REPAHA's development. At that time, member countries must increase their support for the regional center in terms of both money and personnel. It is anticipated that a Guyanese Advisory Board, which currently functions, will continue to deal with matters associated with the school's location in Guyana.

B. The State Corporations

The most significant change in the organization of the agricultural sector since the independence of Guyana has been the development and growth of the state corporations. These corporations presently control the largest portion of the resources used in agricultural production. State corporations have become the primary vehicle of the government for achieving its goal of self-sufficiency in food production. In recent years, most of the major schemes for agricultural developments have involved one or more of the state corporations. This is especially true when the schemes involved capital investments.

The primary functions of the state corporations involved in the agricultural sector are the production and processing of agricultural products. The general trend in Guyana has been toward the industrialization and mechanization of all aspects of agriculture in order to increase food and other types of agricultural production. This trend has resulted in a shift from traditional modes of production involving private producers and requiring only low levels of capital investments to more modern methods requiring levels of investment not available from a weakened private sector. The Government has employed of the State Corporations as a means to make these investments.

It should be noted that there is diversity in the forms that the various corporations have taken. Some are similar to corporate farming operations in the United States. GUYSUCO is an example of this form. It owns its land and employs workers who are paid wages to perform the various tasks associated with cane production and sugar processing. It also has a degree of vertical integration. Thus, while GUYSUCO is a State Corporation, it is not radically different from a private American corporation or from Bookers Sugar Estates, the private company that was nationalized to form GUYSUCO. The major difference is that the Government of Guyana appoints the Board of Directors and the profits go to the public coffer rather than to stockholders.

The Guyana Rice Board represents a completely different type of State Corporation. It is not actually involved in production activity. Small private farmers continue to produce most of the rice of Guyana. GRB provides agricultural inputs and technical services and serves as the marketing agent for rice. Many of the major capital expenditures

for such activities as milling and irrigation have been made by the government through GRB. Thus, GRB is more of a service organization than a typical business.

An organization like the MMA-ADA fits the business model even less. It is the organization that the government is using to develop a major irrigation and drainage scheme for agricultural development which requires major capital expenditures. MMA-ADA is establishing the necessary infrastructure and is providing technical assistance to the farmers, but it is not involved in production, processing or marketing.

Organizationally, the State Corporations are under the Ministry of Agriculture. It should be noted that they are directly responsible to the Minister and not to the professionals in the Ministry. Except for general direction and overall policy, the various corporations remain essentially independent of the Ministry. Each has its own Board which directs its activities.

The governance of many of the corporations is further complicated by the fact that they are also organizationally part of the Guyana State Corporation (GUYSTAC). GUYSTAC is an umbrella corporation involving most of the state corporations, both agricultural and non-agricultural. It is directly responsible to the President of Guyana. The jurisdiction of GUYSTAC relative to the Ministry of Agriculture is not clearly defined. Furthermore, not all of the agricultural corporations are a part of GUYSTAC. While GRB, LIDCO, GFL, GPC, and GMC are a part of GUYSTAC, GUYSUCO, MMA-ADA, TEB and GAIBANK are independent. The confusion with regard to the governance of the corporations at times results in poor planning and coordination with other parts of the agricultural sector.

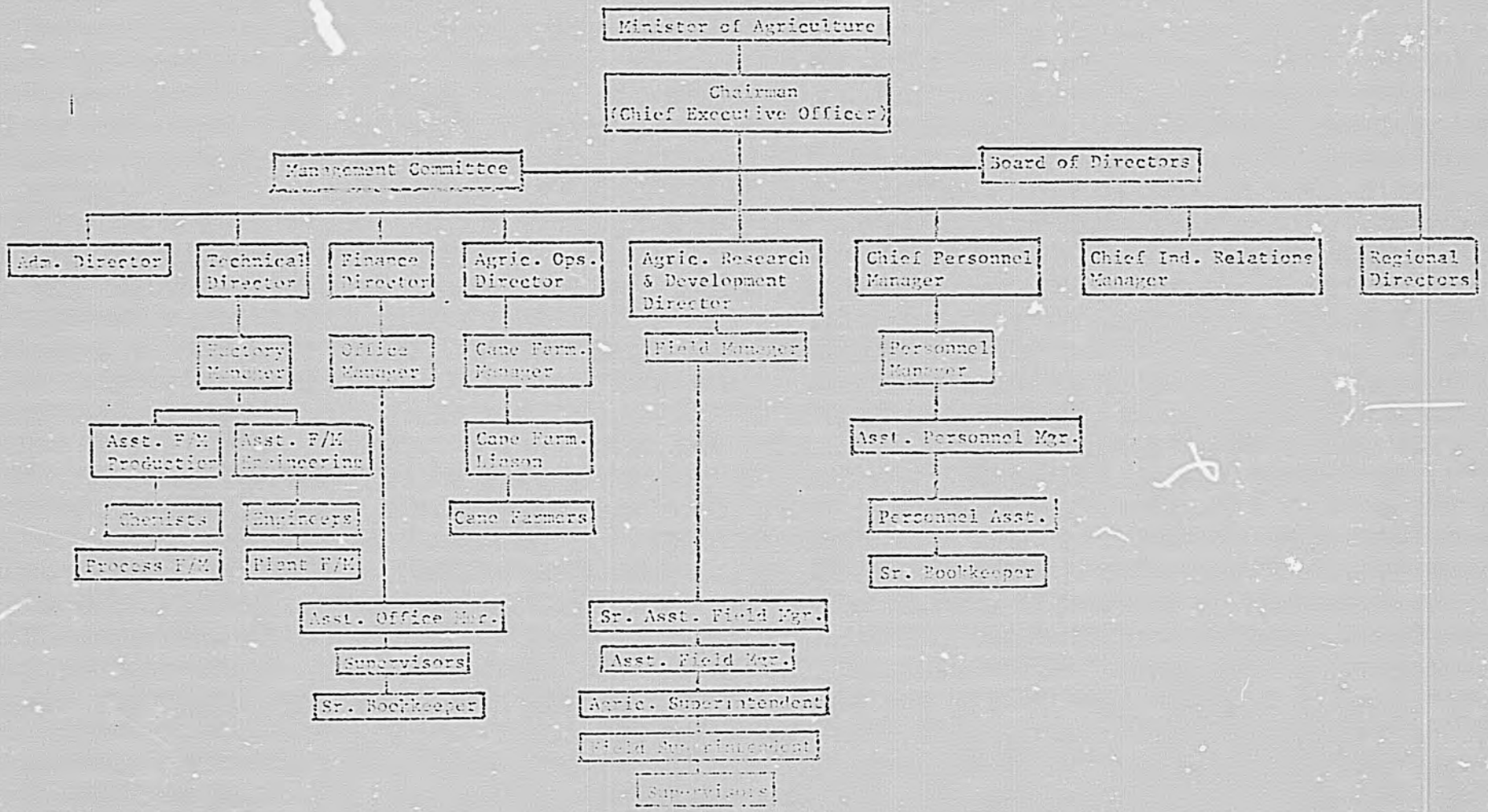
With regard to the REE system, the State Corporations are typically involved in both research and extension activities, but these are usually independent of each other and of the Ministry of Agriculture.

1. Guyana Sugar Corporation Ltd. (GUYSUCO)

The Guyana Sugar Corporation was organized to operate the sugar estates and mills after they were nationalized in the 1970's. GUYSUCO maintained, to a large degree, the organizational structure that had been used by Bookers. The major change was that GUYSUCO was placed under the jurisdiction of the Minister of Agriculture. Figure 3.13 contains the organizational chart for GUYSUCO. Bookers had started the practice of employing Guyanese in key managerial positions a number of years prior to nationalization. This made for a rather smooth transition after nationalization. Furthermore, a number of the key expatriate managers remained with GUYSUCO until they completed their contracts.

Figure 3.10

ORGANIZATIONAL CHART - GUYSUCO



As evidenced by the organizational chart, GUYSUCO is a large and complex organization (over 33,000 employees). The Corporation has a Board of Directors made up of key officers in the organization and high ranking officials from outside GUYSUCO. (For example, the Chief Agricultural Officer of the Ministry of Crops and Livestock is a Board member). The Chairman of the Board of Directors serves as the Chief Executive of the Corporation. Much of the direction for the Corporation comes from the Management Committee, which is made up of key officers in the Corporation.

Most of the agricultural professionals, especially those involved in research and/or extension, are found in one of two Departments. The Agricultural Operations Department is responsible for production and employs agricultural scientists on the various estates. It also employs Cane Farming Managers who provide the technical (extension) package to the independent cane farmers associated with the various estates. The Other Crops Division is also under the Agricultural Operations Department. This Division has the responsiblity for the development and production of crops other than sugar. It employs research personnel to work on problems related to producing alternative crops and in some cases extension personnel to promote production with private growers. Most of the research in GUYSUCO is done in the Agricultural Research and Development Department. This department has an active program in both applied and basic research. GUYSUCO, because of the long history of sugar research in Guyana, operates the most successful research program in the country.

2. Guyana Rice Board (GRB)

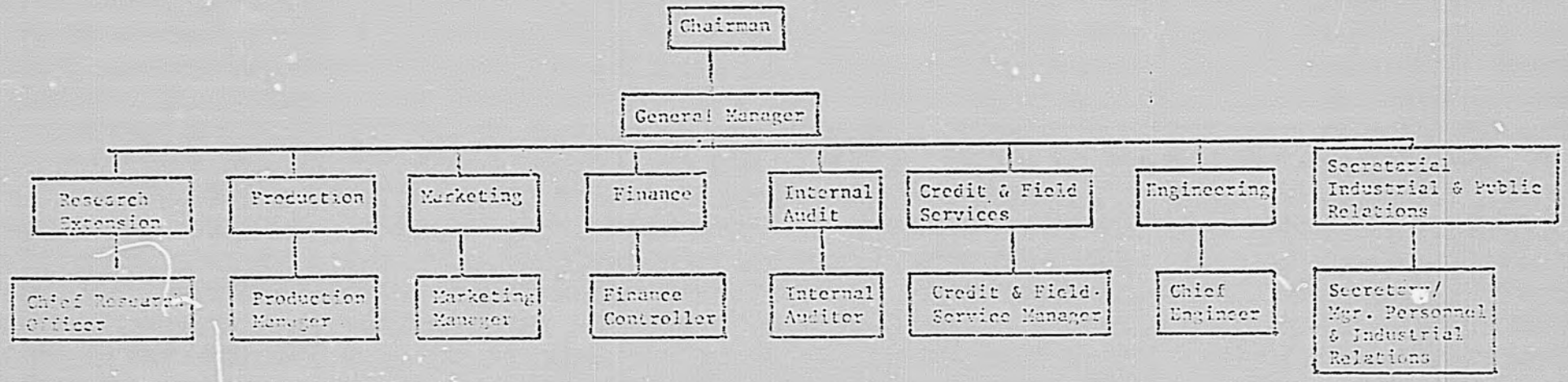
GRB was formed in 1973 when the Guyana Rice Marketing Board and the Guyana Rice Corporation was merged. Combining these two corporations into a single organization was done to improve the coordination between rice production, milling and marketing. GRB is involved in all rice producing areas along the coast of Guyana from Crabwood Creek in Berbice to the Pomeroon River in Essequibo. Currently employing about 3,500 workers, GRB provides the inputs for paddy production, offers technical assistance to farmers and handles the marketing of rice and rice by-products both for the domestic and export market.

Figure 3.14 contains the organizational chart for GRB. GRB is presently governed by a 12-member board. Three of the members are rice farmers and the board is headed by an Executive Chairman named by GUYSTAC. The General Manager is the chief executive officer of GRB and reports directly to the Board. He is charged with the responsibility for carrying out the Board's policies and supervising the daily operations of GRB.

Most of the agricultural professionals employed by GRB are employed in one of three departments--Marketing, Production or Research and Extension. Of particular concern to this study is the Research and Extension Department. This is where the KEE functions in GRB are per-

Figure 3.14

ORGANIZATIONAL CHART - GUYANA RICE BOARD



formed. As will be noted in the following chapter, GRB's research program has been successful in developing high yeild varieties, while its extension program has been much less successful.

3. Mahaica-Mahaicony-Abary Agricultural Development Authority (MMA-ADA)

The MMA-ADA was established by an Act of Parliament in 1977 to coordinate and control the development of the land and water resources in the drainage areas of the Mahaica, Mahaicony and Abary Rivers. The Authority is the agency that is developing the irrigation and drainage infrastructure necessary to increase agricultural production in the area. Currently the Authority is completing a dam to create a large water conservancy to provide irrigation and flood control and a network of canals for irrigation and drainage.

Figure 3.15 contains the organizational chart for MMA-ADA. There is a nineteen member Board which governs the Authority. The Board includes as members the Minister of Agriculture, the Regional Minister, key officials of MMA-ADA, and representatives from key State Corporations such as GRB, GUYSUCO, CMC, LIDCO and CAIBANK. It also includes farmers from the project area. There is an Executive Committee which includes the Chairman of the Authority, Deputy Chairman, General Manager and three heads of key MOA Departments.

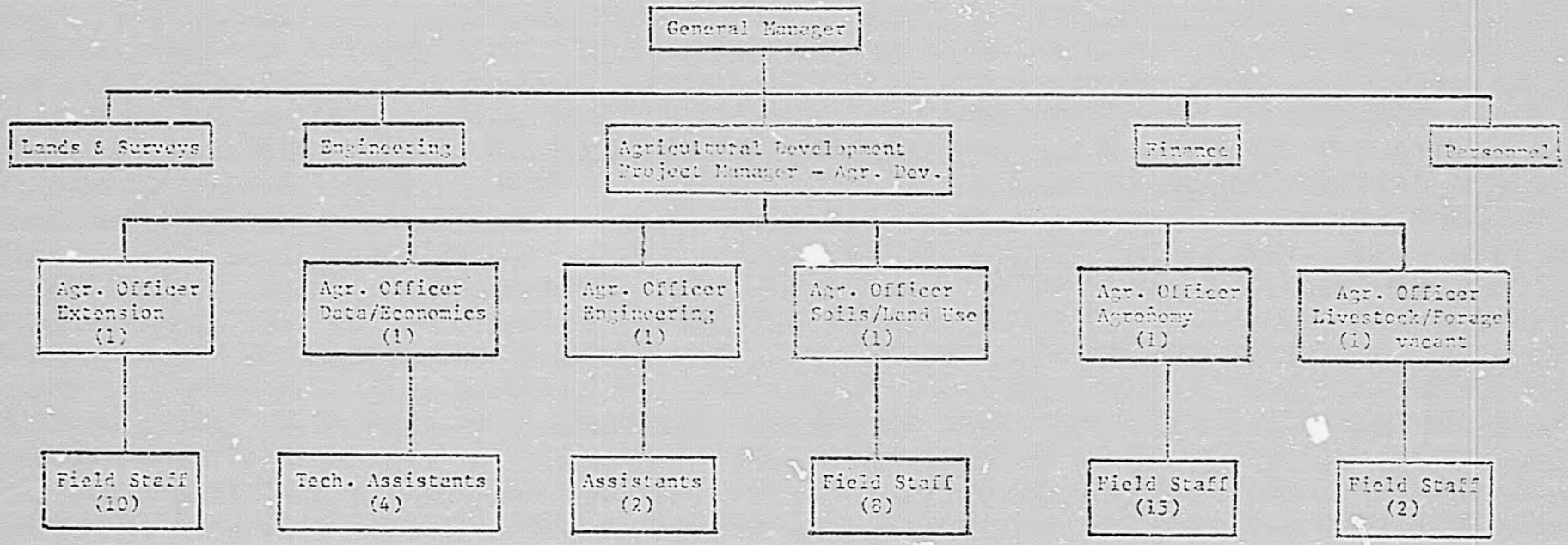
The General Manager serves as the chief executive officer of the Authority. The General Manager and the Project Managers form the Operating Management Committee. There are currently five Departments in the Authority--Lands and Surveys, Engineering, Agricultural Development, Finance and Personnel. Most of the agricultural professionals, especially those involved with the REE system are employed in the Agricultural Development Department. There are six divisions or sections in this department--Extension, Data/Economics, Engineering, Soils/Land Use, Agronomy, and Livestock/Forage. Each of these divisions is headed by an Agricultural Officer.

4. Livestock Development Company (LIDCO)

The Livestock Development Company (LIDCO) was formed in 1975 to encourage the development of major production schemes with beef and dairy cattle. The company was started as a joint enterprise with both private and public capital. The Government of Guyana initially held 51 percent of the shares in the company. Over the past five years, the Government's share in the company has risen to over 90 percent. The increase in government ownership has been due primarily to the addition of Government ranches and other holdings to the company. At the present time, LIDCO operates five ranches in the country.

Figure 3.15

ORGANIZATIONAL CHART - MAHAICA-MAHAICONY-ABARY AGRICULTURAL DEVELOPMENT AUTHORITY (MCA-ABA)



1. Ebini--a beef and dairy farm in the Intermediate Savannahs; this facility was previously a MOA research station for livestock and forage;

2. Moblissa--a new dairy scheme near Linden; this scheme was started in the mid-70's to provide fresh milk to the Georgetown market;

3. Pirara, a beef ranch in the Rupununi District; Pirara was originally a private ranch and was nationalized after its owners left the country;

4. Kabawer--a beef and steer finishing ranch on the Abary River; it was part of the Bookers operation that was nationalized;

5. Mara--a beef ranch on the Berbice River. (Note that jammoon fruit used in making wine has recently been started at Mara.) Mara was a private ranch prior to the forming of LIDCO.

LIDCO also operates a milk processing plant in Georgetown.

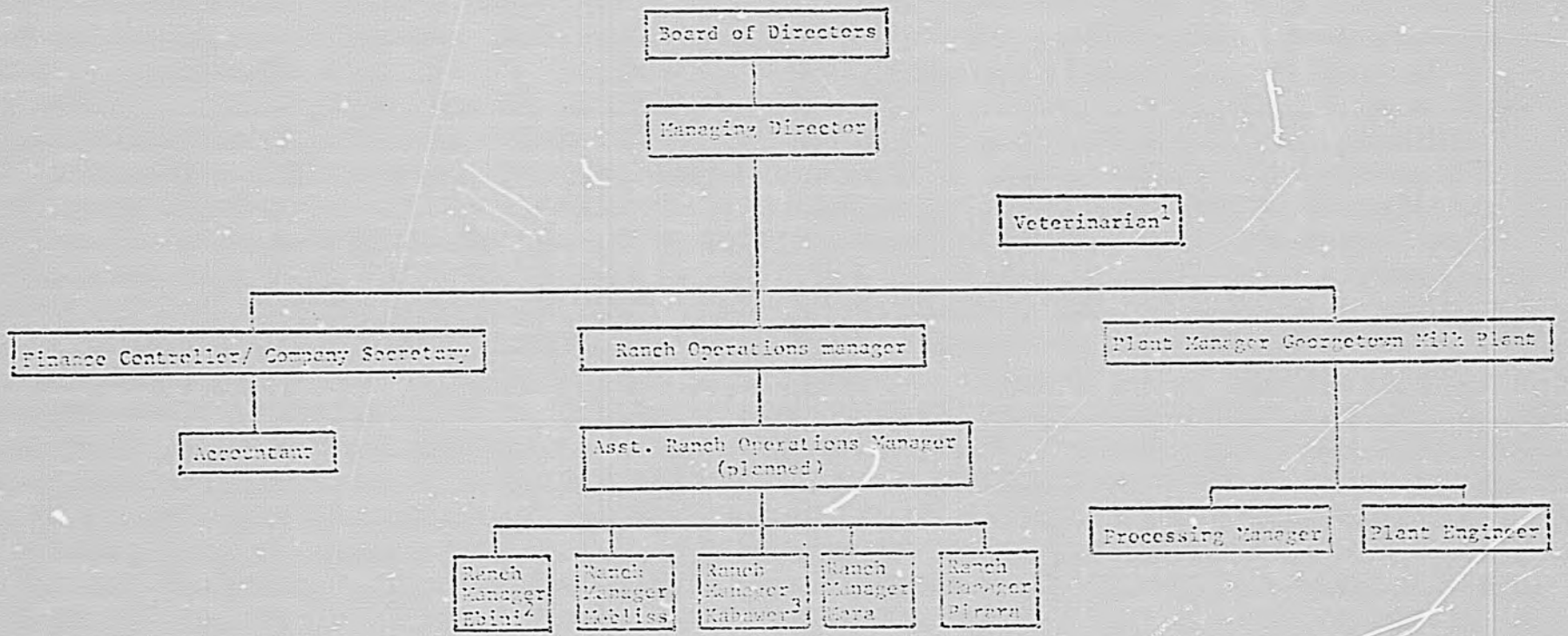
Figure 3.16 provides a diagram of LIDCO's organization. Authority resides within the Board of Directors. The Board consists of nine members; five are appointed by the Minister of Agriculture and three by the shareholders. The ninth member of the Board is the Managing Director of the Company, who is in charge of the day-to-day operations of the company. The current Chairman of the Board is the Principal Agricultural Officer of the Division of Veterinary and Livestock Sciences in the Ministry of Crops and and Livestock.

There are three major divisions beneath the Managing Director--the Finance Office headed by the Controller, the Ranch Operations headed by the Ranch Operations Manager and the Milk Processing Plant headed by the Plant Manager. Each of five ranches/farms has a Manager who is responsible to the Ranch Operations Manager.

Currently, there is litte research being performed by LIDCO. However, it is anticipated that as the Company develops it will gradually add research components to its operations. There has been a substantial amount of research conducted at Ebini in the past, and one should expect this to continue. LIDCO provides extension services to some private producers, especially at the Moblissa Dairy Scheme. LIDCO has experienced major problems with the scheme at Moblissa. Production has been far below the anticipated levels and private producers have been reluctant to move to the project site because of its location.

Figure 3.16

ORGANIZATIONAL CHART - LIVESTOCK DEVELOPMENT COMPANY (LIDCO)



1 has specialist function in areas of Veterinary Public Health and Animal Health

2 is in charge of Ebini Ranch and Ebini Dairy Operations

3 is in charge of Unbawer Ranch and Kabawer (gold dredging) steer-finishing operations

5. Timber Export Board (TEB)

The Guyana Timber Export Board (TEB) was created in 1973 by the Guyana Timbers Export Act No. 8. It is a public corporation under the Ministry of Agriculture. Prior to January, 1981, it was under the jurisdiction of the Minister of Natural Resources, Energy and Mines.

Figure 3.17 provides a diagram of the organizational structure of TEB. The General Manager is the chief executive officer and reports to the Board of Directors. The primary goal of the Board is to regulate the export of timber. It registers firms as producers, subject to the approval of the Minister of Agriculture, and charges fees for services rendered by TEB. The Board recommends programs for maintenance, control and regulation of timber supplies. It also has the exclusive right to negotiate orders for purchase of timber for export. It then allocates the orders among registered producers. TEB currently plays only a limited role in research and extension. However, as the Board attempts to develop new products and markets these functions can be expected to expand.

6. Guyana Fisheries Limited (GFL)

Guyana Fisheries Limited (GFL) is a parastatal corporation that commercially exploits marine fish and shrimp resources. It is composed of three components: the main trawling vessel operation, the McDoom shrimp processing plant and the Kingston plant that processes the by-catch. The primary goal of the corporation is the development of the commercial fisheries industry. Shrimp is primarily exported, while the by-catch is processed into products for local consumption.

GFL was founded in 1969, when Guyana Marine Foods, Guyana Stores Trawling Division and the McDoom Processing Plant merged. The trawling fleet presently consists of 26 trawlers--18 shrimp trawlers and 8 fishing boats. The size of the fishing fleet operating in Guyana waters is about 100 boats. Thus, this is a fairly small operation in terms of other national fleets. Shrimp trawlers are required to bring at least 4,000 lbs of fish bycatch in for processing from each trip.

The organizational structure for GFL is presented in Figure 3.18. The Operational Director is the chief executive officer for the company and is responsible to the Board of Directors. Under him are managers for the fleet operations, the McDoom Plant and the Kingston Production Plant, as well as an administrator for the port used by the fishing vessels.

Figure 3.17

ORGANIZATIONAL CHART - TIMBER EXPORT BOARD

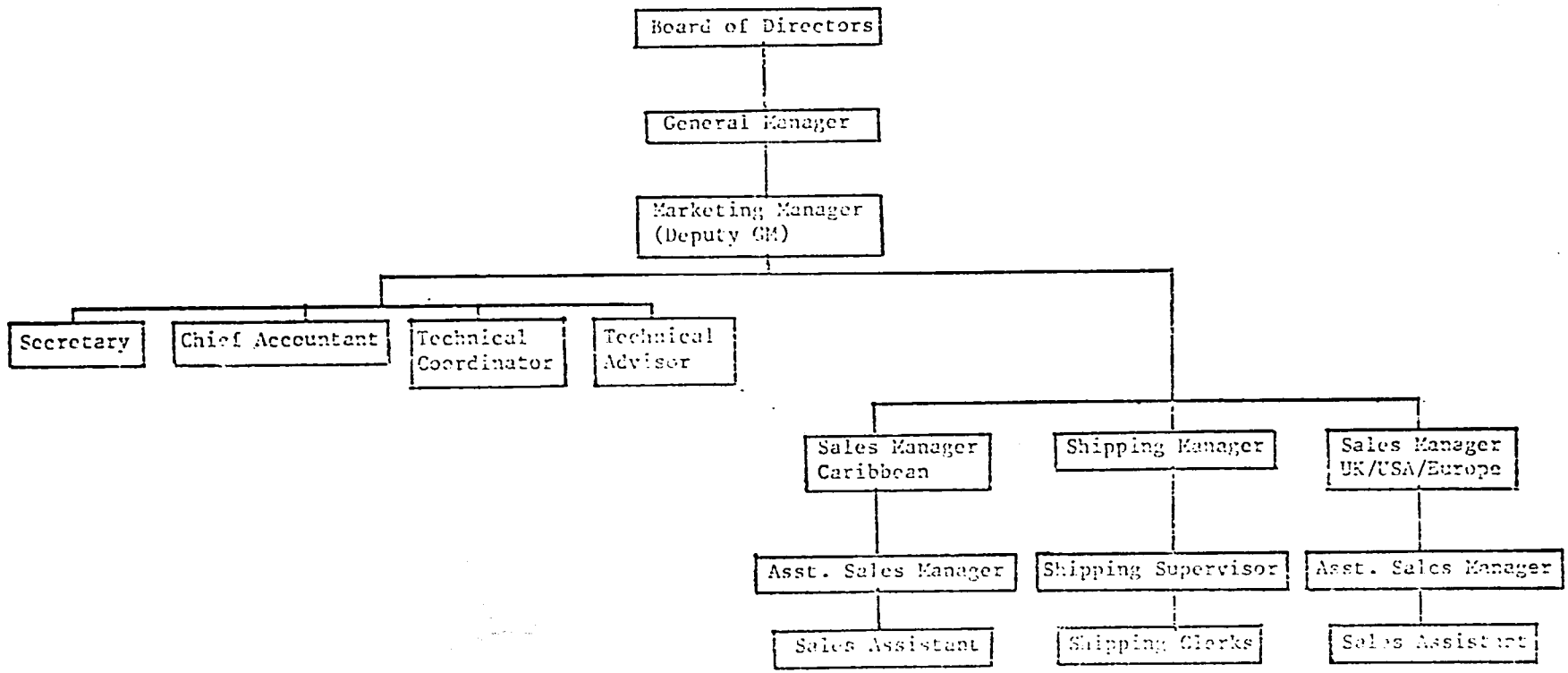
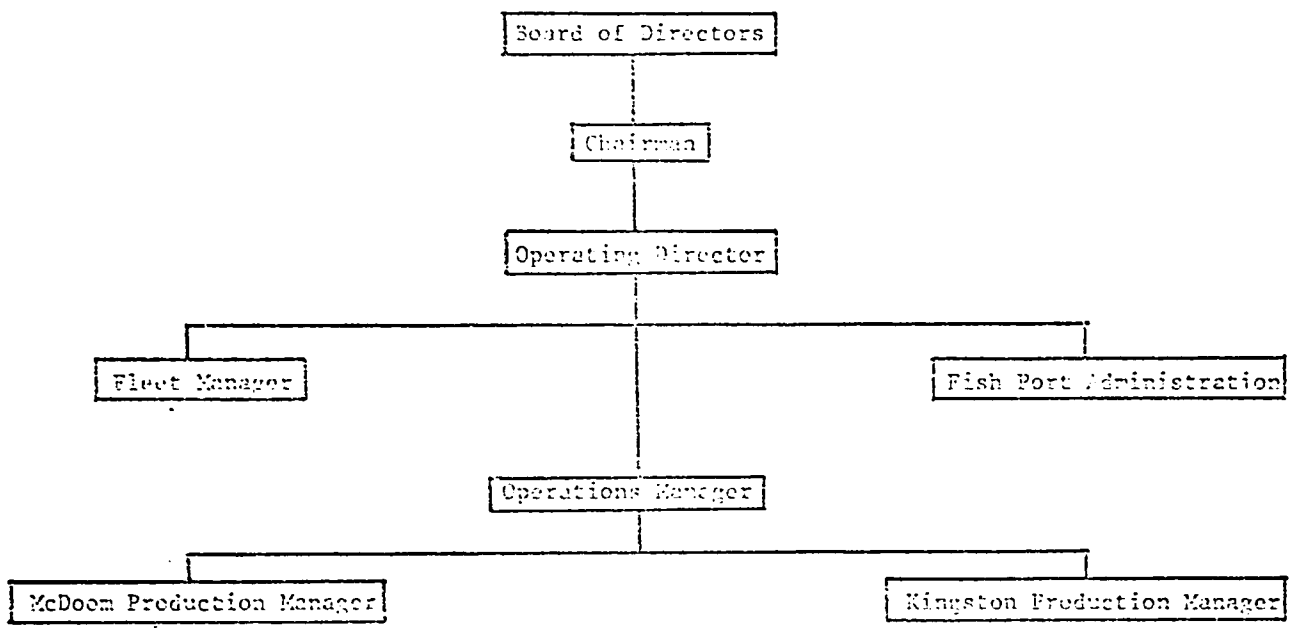


Figure 3.18

ORGANIZATIONAL CHART - GUYANA FISHERIES LTD. (GFL)



7. Guyana Agricultural and Industrial Bank (GAIBANK)

The Guyana Agricultural and Industrial Bank (GAIBANK) was founded in February 1978 and made its first loan in October of the same year. It was established primarily to provide production loans to farmers. In 1978, its functions were expanded to include the promotion of investments in agricultural businesses. GAIBANK's program has expanded to the point that, in 1980, it extended more than 50 percent of all credit provided to farmers in Guyana.

The major objective of GAIBANK is to supply agricultural credit to small farmers, and cooperatives involved in agriculture and industry who cannot obtain loans through regular commercial channels. It offers lower interest rates than commercial banks. This subsidized credit program is both necessary and beneficial to Guyana. Private producers with small acreages produce most of the food for local consumption and the rice for export. Without the GAIBANK credit program, they would be unable to purchase the necessary inputs for their farming enterprises. Size is one of the factors which limit farmers' ability to obtain credit from regular banks. Another is land tenure. Much is the land is owned by the government and leased to the farmers. Lacking title, the farmers cannot use it for collateral.

Figure 3.19 provides an organizational chart for GAIBANK. The Bank is governed by a Board of Directors. The Managing Director is the chief executive officer of the bank. There are five major divisions in the bank--General Administration, Projects, Regional Administration, Loans and Finances. Most of the agricultural professionals are employed in the Loan section. These are primarily graduates of GSA who serve as GAIBANK's contact with the farmer. In terms of the REE system, it is these loan analysts who perform an extension-type function.

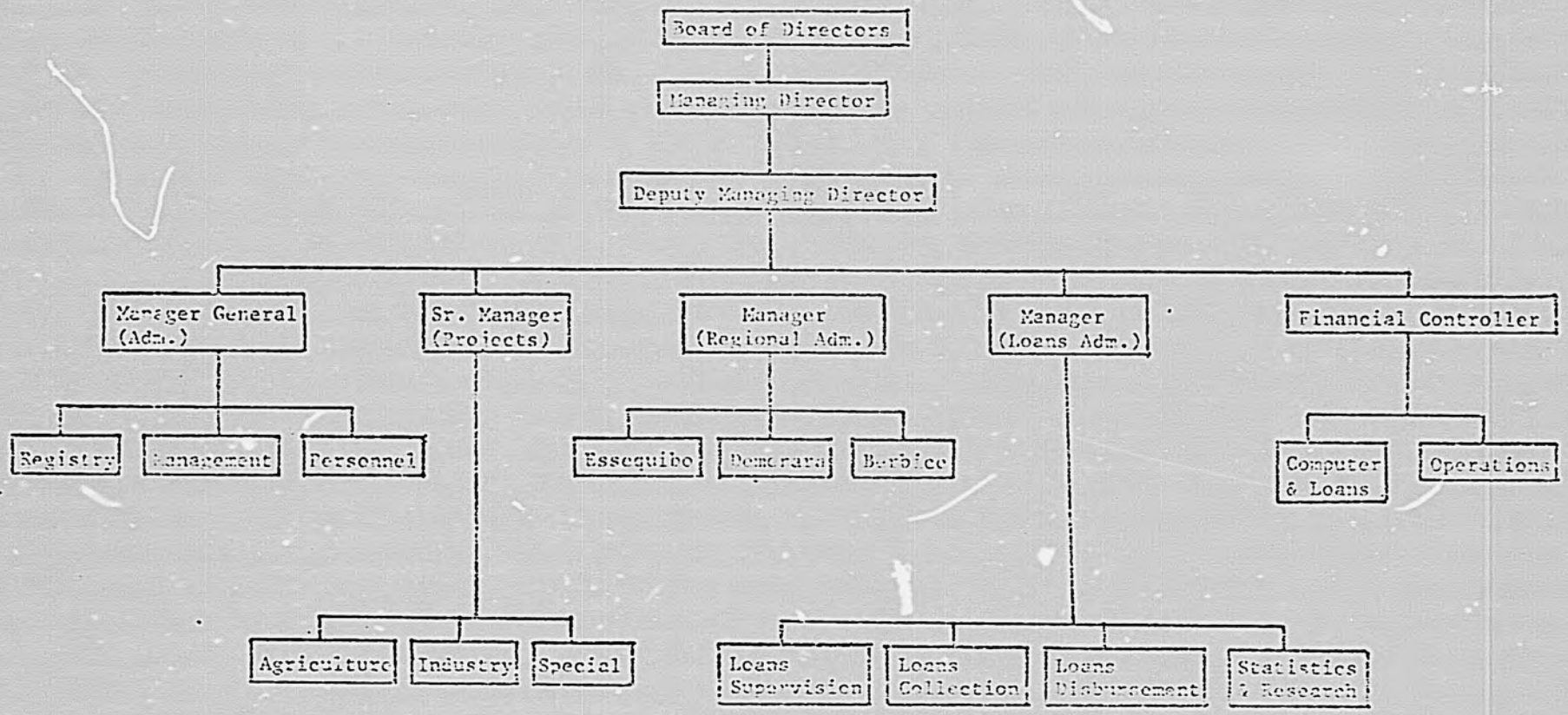
As will be noted in the section on extension in the following chapter, GAIBANK's current administrative structure and procedures are highly centralized and result in substantial time-lag between the initiation of the loan application by the farmer and the actual granting of the loan. Successful agriculture requires timely inputs. Delays in credit pose major problems for Guyanese farmers.

8. Guyana Pharmeceutical Corporation (GPC)

The Guyana Pharmeceutical Corporation (GPC) was formed when the Drug Manufacturing and Distributing Section of the Bookers' holdings were nationalized in the mid-1970's. GPC has become involved in a large and diverse number of commercial enterprises, both agricultural and non-agricultural. GPC is currently composed of the following manufacturing units:

Figure 3.19

ORGANIZATIONAL CHART - GAIBANK



a. Drug Manufacturing Division;

b. Guyana Stockfeeds Limited;

c. National Paints Company, Limited;

d. Quality Foods Limited;

e. National Edible Oil Company, Limited;

f. Guyana Soap and Detergent, Limited;

g. Guyana Marketing Corporation (discussed in the following section);

h Plastics and Garments Division;

i. Industrial Chemical Division;

j. Cosmetics and Toiletries Division.

The situation at GPC is very fluid. Over the last year, GPC has initiated a number of new commercial enterprises. Most of them have been in response to government pressure to produce locally manufactured goods as substitutes for imported items. It was observed that many of the manufacturing activities are being carried out on a small-scale basis, using essentially laboratory rather than commercial equipment.

Figure 3.20 contains the organization chart for GPC. It should be noted that GPC is part of GUYSTAC, as well as being administratively under the Minister of Agriculture. GPC has a Board of Directors and the Executive Chairman serves as the chief executive of the Corporation. Each of the Divisions is headed by a Manager.

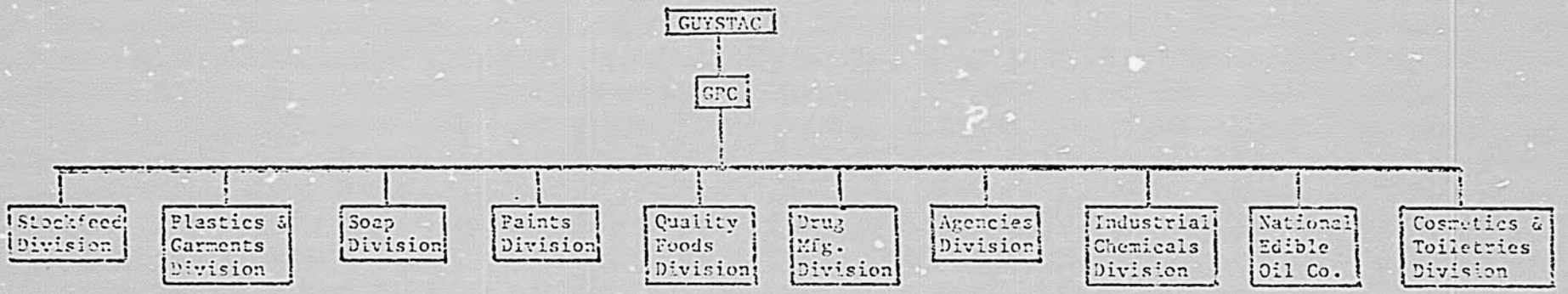
Currently, GPC does not operate either an agricultural research or extension program. However, increasingly the Corporation is becoming aware of the need for both. The agricultural divisions are dependent on private farmers for most of their raw materials. A problem faced by the Corporation is obtaining raw materials in sufficient quantity and of sufficient quality to meet the needs of the operation. Research and extension are increasingly viewed as necessary tools. Research can be used to develop varieties and production packages designed to meet manufacturing needs and extension can be used to encourage farmers to adopt the proper technologies.

9. Guyana Marketing Corporation (GMC)

Guyana Marketing Corporation was established in 1964 by the Government as the institution with primary responsibility for marketing food crops and implementing the Government's minimum price policy. It is responsible for encouraging production of food crops by offering an

Figure 3.20

ORGANIZATIONAL CHART - GUYANA PHARMACEUTICAL CORPORATION (GPC)



assured market and paying guaranteed prices for farmers crops. Thus, GMC is the buyer of last resort. If the farmers are unable to locate buyers in the private sector who are willing to pay at least the guaranteed price then, they can sell their goods to GMC. GMC also serves as a distribution agency for a number of consumer goods and operates a chain of Guyana Stores retail outlets which distributes flour, edible oil and other goods. It operates a ham and bacon factory and participates in a number of import/export operations. Major activities include:

a. meat processing;

b. fresh meat, fruit and vegetable packaging;

c. freezing and canning of fruits and vegetables;

d. fish processing;

e. processing of corn, plantain and soyabeans;

f. poultry processing.

Figure 3.21 contains a diagram of the formal organization of GMC. Recently, GMC was placed under GPC and is in the process of reorganization. The chief operating officer of the Corporation is the Executive Director. GMC is divided into five units, each with a manager--Farm Service Centers, Planning Unit, Marketing, Administration and Financial Department.

Currently, GMC does little in the way of extension or research. However, officials at the Corporations recognize the importance of these activities. GMC has routinely experienced problems with quality control. GMC is included in a new project funded by the Inter-American Development Bank which, among other things, is designed to improve the coordination between GMC, GAIBANK and the Division of Extension and Education. GMC will be responsible for running the Farm Service Centers which are being financed by the Food Crop Production and Marketing Program, the IDB project. These Service Centers will attempt to provide a comprehensive approach to extension, credit and marketing. As these Centers are built and put into operation, one can expect GMC to become much more involved in extension activities.

C. Ministry of Education

The Ministry of Education (MOE) is the agency which is primarily responsible for all levels of education in Guyana. Agricultural education occurs at the primary, secondary and college levels. Figure 3.22 provides an outline of the organization of the primary and secondary components of the system. The Chief Education Officer is the highest ranking professional in the organization. Under him are two Deputy Chief Education Officers--one for Administration and one for Development. The major divisions in the education program are in primary, sec-

Figure 3.21

ORGANIZATIONAL CHART - GUYANA MARKETING CORPORATION (GMC)

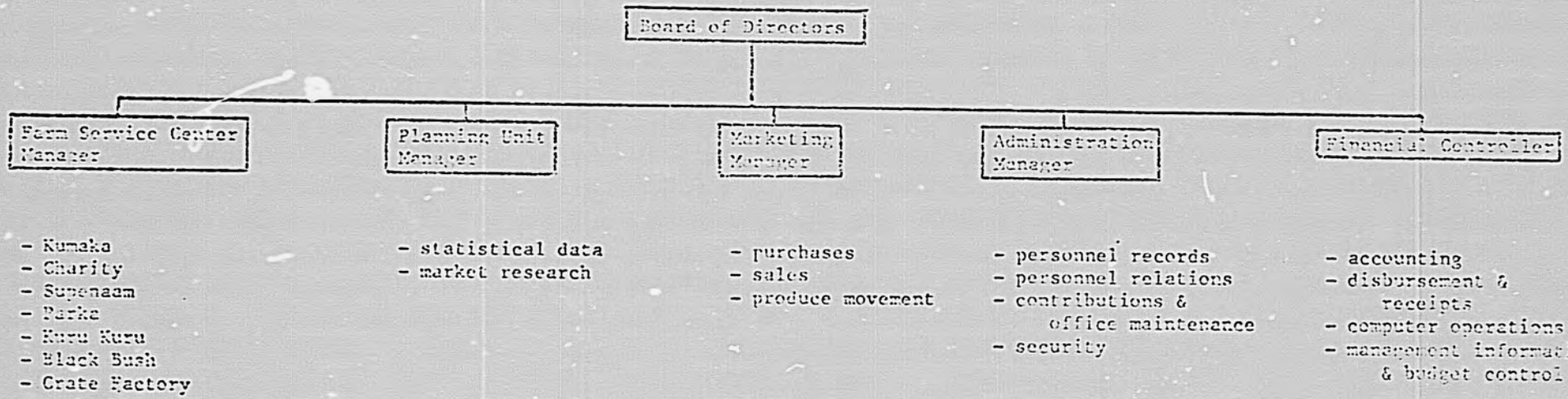
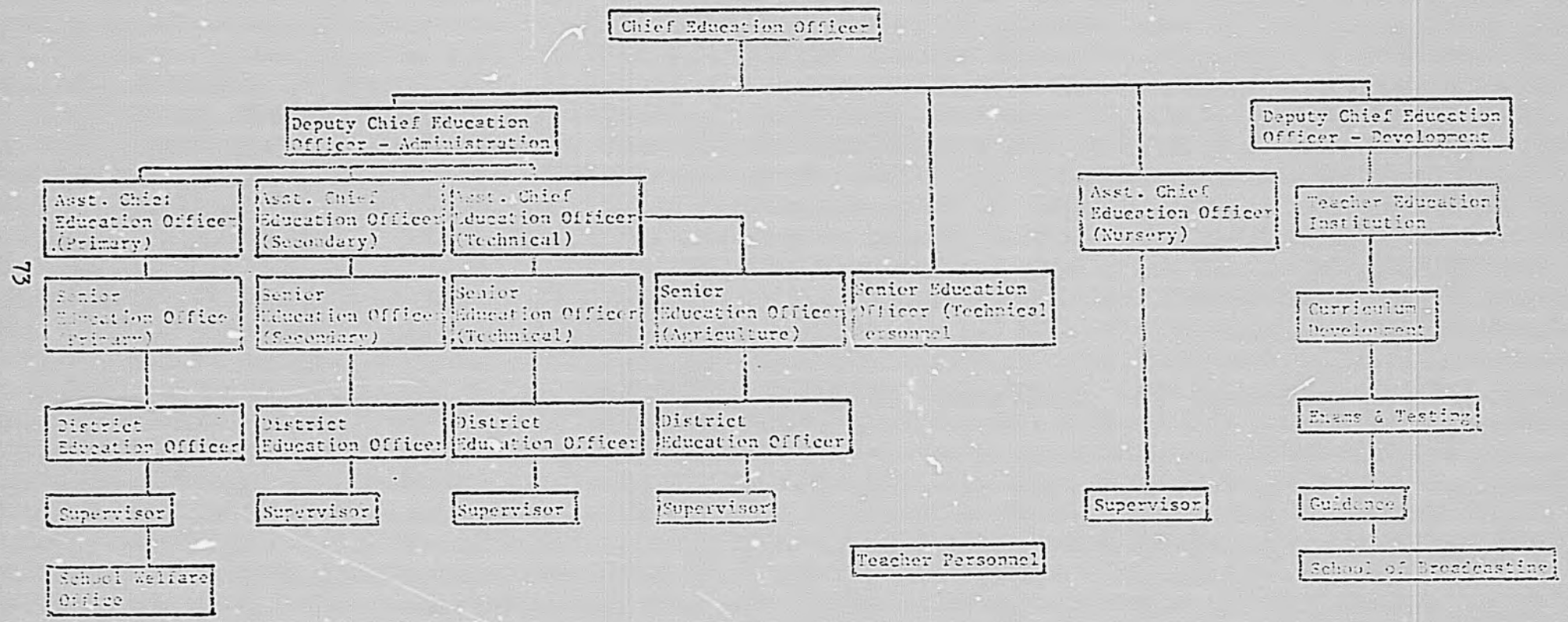


Figure 3.22

ORGANIZATIONAL CHART OF THE MINISTRY OF EDUCATION, SOCIAL DEVELOPMENT AND PLANNING



ondary and technical education, each of which is headed by an Assistant Chief Education Officer. Agricultural Education is under Technical Education, as are the Divisions of Agricultural Education and Home Economics.

1. Division of Agricultural Education

Agricultural education programs are available in more than 85 percent of Guyana's primary and secondary schools. Most of these schools have farms or agricultural plots attached to them.

The Senior Education Officer for Agriculture is the head of the Division. Figure 3.23 provides an overview of the organization within the Division. The Senior Education Officer is assisted by three Education Officers who in turn direct eight Supervisors. These Supervisors work with the teachers in the various primary and secondary schools in Guyana. In addition to the teaching function of the Division, it also sponsors Agricultural Clubs for youths. These clubs are similar to 4-H and FFA clubs in the United States and perform an important extension function.

The Agricultural Education program in MOE appeared to be quite dynamic and growing. There appeared to be a real commitment from key officials in MOE and the Government for the continued development of this curriculum. What is lacking a formal link between this program and the various programs of MOA, especially the extension programs. Since one of the major reasons to include agricultural education in the primary and secondary schools is to ultimately improve Guyanese agriculture, it is important to develop a strong link between the Division of Agricultural Education and the various Divisions in MCL.

2. Division of Home Economics

The Division of Home Economics is administratively under the Senior Education Officer for Technical Programs, which includes Industrial Arts as well as Home Economics. (See Figure 3.24.) There is an Education Officer for Home Economics. Below that level are Supervisors and Teachers.

As education in Guyana moved away from the traditional British model, Home Economics has become a part of the general education requirements. The stated functions of the Division are:

a. To assist people to be self-sufficient;

b. To provide students with necessary skills for gainful employment;

c. To encourage students to pursue higher education.

Figure 3.23

ADMINISTRATIVE/ORGANIZATIONAL DELIVERY SYSTEM FOR AGRICULTURAL EDUCATION IN SCHOOLS (GUYANA)

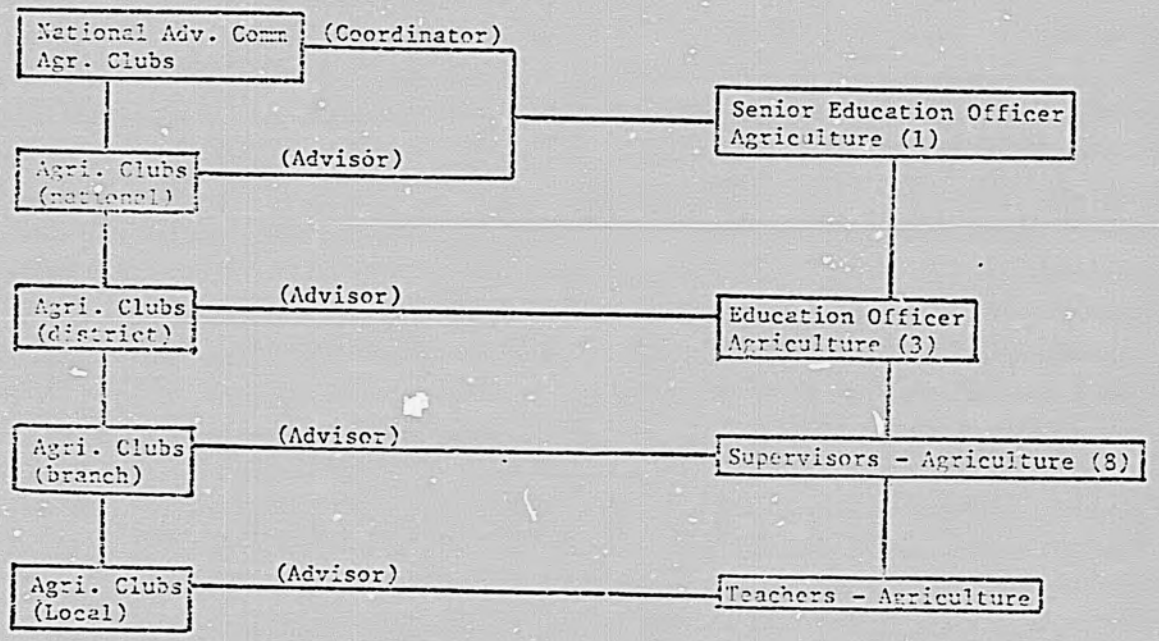
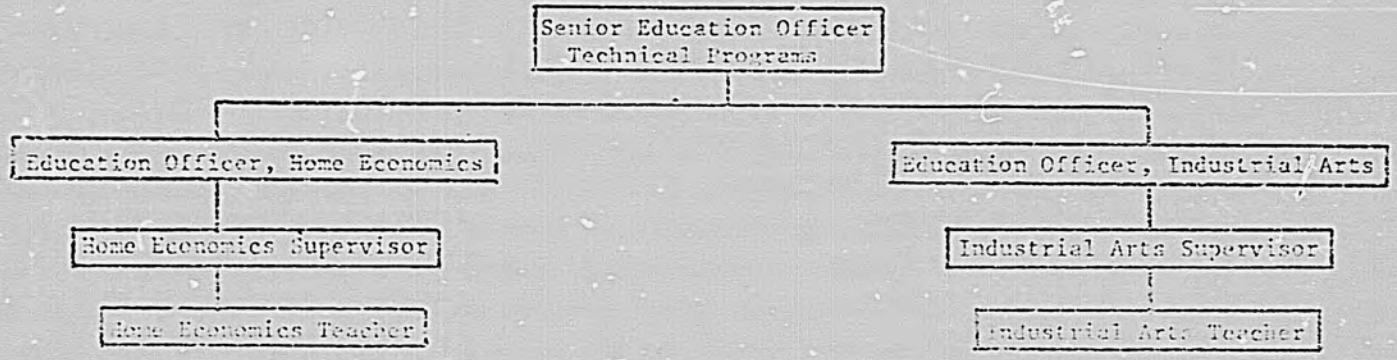


Figure 3.24

ORGANIZATIONAL CHART - DEPARTMENT OF HOME ECONOMICS

(Ministry of Education)



3. Fredericks and Carnegie Schools of Home Economics

The Ministry of Education operates two secondary level schools of home economics--the Fredericks School of Home Economics and the Carnegie School of Home Economics. Both of these schools are in Georgetown. They provide a diversified curriculum including needlecraft, foods and nutrition, home management, crafts and health education. Students enrolled in the teacher training program at the College of Education do their in-service training at these schools.

4. University of Guyana--Faculty of Agriculture (UG-FA)

The University of Guyana was established in 1963 by the legislature of British Guiana. Initially, it had degree programs in the arts, sciences and social sciences. A Faculty of Education was added in 1967 and a Faculty of Technology in 1969. The Faculty of Agriculture was created in 1977.

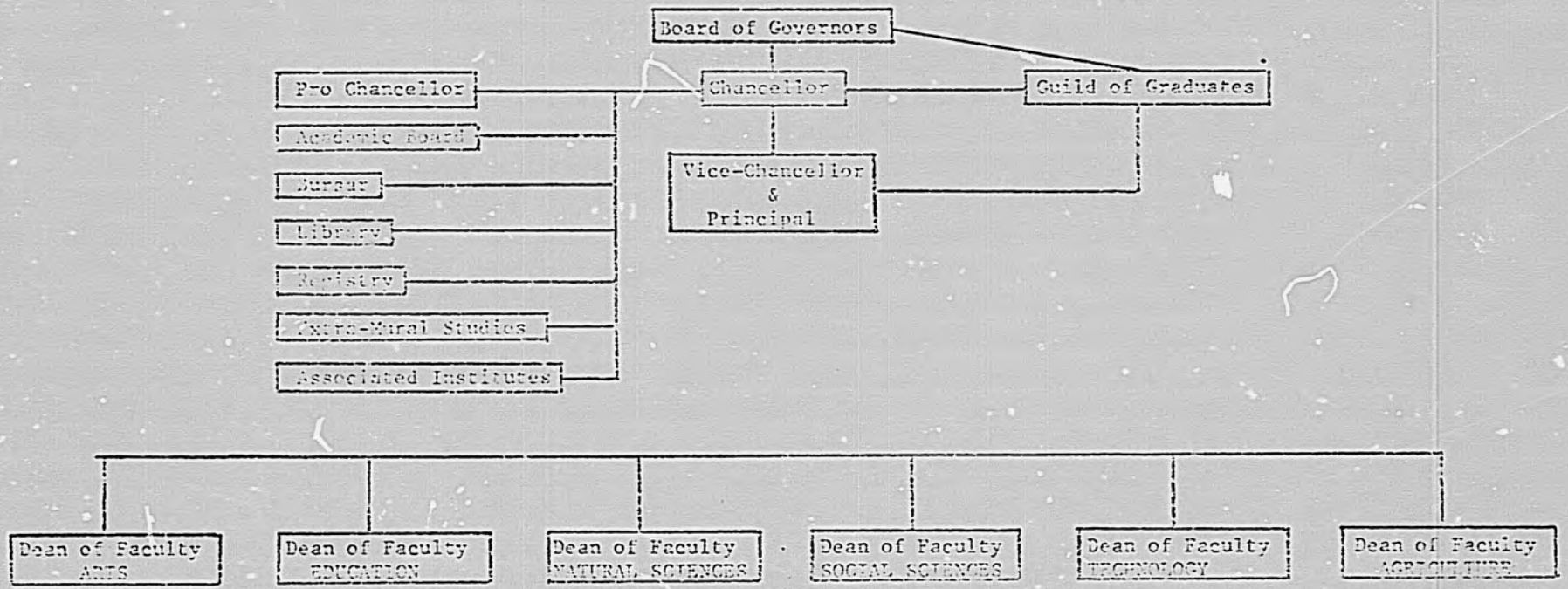
Under the jurisdiction of MOE, the university is operated by a Board of Governors which is responsible for broad university policy, especially that relating to upper-level appointments, finance, investments, purchases, loans and legal matters. Figure 3.25 contains the organizational chart for UG. It should be noted that Board has broad representation from the political and economic interests of the country. An Academic Board has primary jurisdiction over the academic program and is responsible for the general direction of research, instruction, examinations and the awarding of degrees, diplomas, certificates and other distinctions. The Chancellor serves as the chief administrative officer of the university, while the Vice-Chancellor is the chief academic officer of the University.

With the exception of the Faculty of Agriculture, the various Faculties are divided into academic departments. The Faculty of Agriculture is new and has thus far lacked the resources necessary to employ an adequate faculty or to develop a comprehensive academic program. These factors will be discussed in detail in the following chapter. The Faculty of Agriculture currently has a Dean who serves as head of the Faculty and performs the greatest part of the teaching tasks. He is assisted by several part-time personnel.

Given the current weaknesses of the Faculty of Agriculture it is important to assess its prospects for the future. It seems to enjoy strong support from the administration, but there is some ambivalence in terms of the support from the other Faculties. The need for university-level training in the field of agriculture is almost universally recognized. However, given the fact that resources are scarce and that economic support of the Faculty of Agriculture could easily result in cuts in other programs, faculty members are often less than enthusiastic in supporting efforts to aid the development of the Faculty of Agriculture.

Figure 3.25

ORGANIZATIONAL CHART - UNIVERSITY OF GUYANA



Outside the university and MOE, the Faculty of Agriculture seems to have its greatest amount of support from the Ministry of Agriculture. The Minister of Agriculture pushed the hardest for the establishment of the Faculty. Most of the State Corporations also have voiced an interest in the program, however, they seem to be taking a wait-and-see attitude. It is felt that the program is too new and unproven to be able to judge whether or not it will be able to provide a significant portion of the trained manpower needed for Guyana's agricultural development.

An important issue to address concerning the Faculty of Agriculture is its relationship to the Guyana School of Agriculture (GSA). UG-FA is currently heavily dependent on GSA for at least two years of its program; i.e., UG-FA students do at least two years of their work at GSA, although there is no formal organizational link between UG-FA and GSA. If the relationship between the two institutions is going to continue their organizational relationship should be defined.

CHAPTER IV

DESCRIPTION OF THE AGRICULTURAL RESEARCH, EDUCATION AND EXTENSION SYSTEM

This chapter provides a description and analysis of the current REE System in Guyana. Each of the sub-systems is treated separately. The purpose of this analysis is to assess the strengths and weaknesses of the current system. It will also serve as the basis for recommendations to improve the system.

A. Agricultural Education in Guyana

Agricultural training is currently found at all educational levels in Guyana, primary, secondary, tertiary and technical. Responsibility for the agricultural education system is shared by the Ministries of Education and Agriculture. The system is designed to produce both agricultural practitioners and agricultural scientists and technicians. There has been a major emphasis on agricultural education since independence. This reflects the government's commitment to the development of the agricultural sector and goal of self-sufficiency in food and fiber. Since agricultural education is an integral part of the total educational system, it is necessary to understand the overall educational system.

1. An Overview of the Current Educational System in Guyana

The Ministry of Education (MOE) is the agency primarily responsible for all levels of education in Guyana. Education is provided free by the government from Nursery School through University. All education is conducted by the government, parochial education having been absorbed into the governmental system in 1976. Schooling is compulsory from ages 5 years 9 months to 15 years. It is estimated that Guyana has rates of school attendance as follows:

6 - 11 years of age -- 95.6 percent;

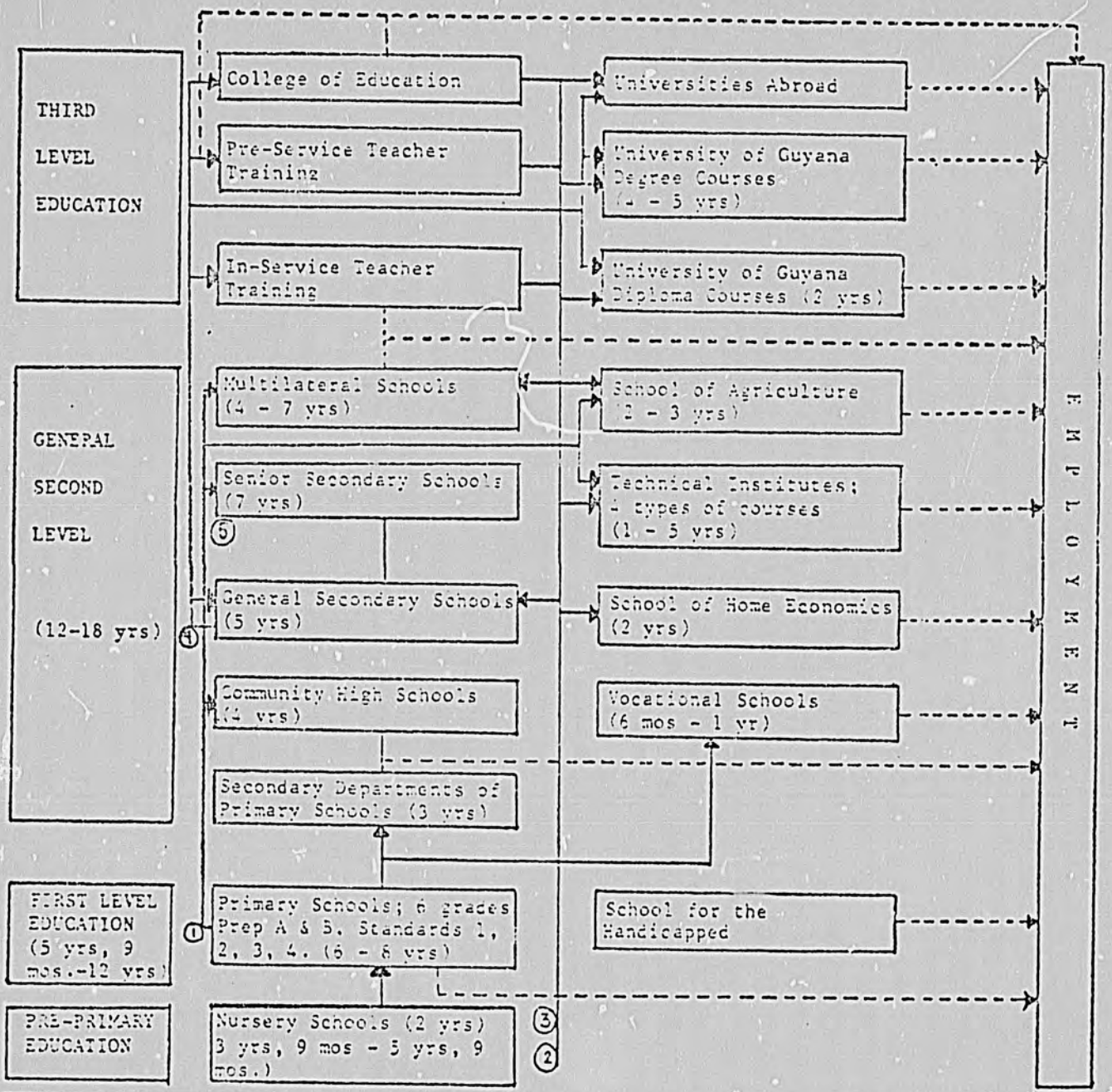
12 - 17 years of age -- 70 percent;

18 - 23 years of age -- 7.4 percent.

Figure 4.1.1 shows the structure of education in the over-all educational system in Guyana. It includes the age ranges for each level and the requirements for admission to the various programs.

Figure 4.1.1

EDUCATION SYSTEM IN GUYANA



EXAMINATIONS:
1. Secondary Schools Entrance Examination
2. Preliminary Certificate Examination
3. College of Preceptors Examination
4. General Certificate of Education, Ordinary Level - GCE-O Level
5. General Certificate of Education, Advanced Level - GCE-A Level

SOURCE: Ministry of Education, GOG, A Digest of Educational Statistics, July 1976

Very little agricultural education is included in the primary grades because the children are much too occupied preparing for the Secondary School Entrance Examination and both parents and students object to taking time away from this preparation. However, agricultural education is included in Secondary Schools throughout Guyana. These programs are strongly emphasized, with many of the schools operating, or in the process of developing self-supporting school farms. There are four kinds of secondary schools: "Tops of Primary" Schools, Community High Schools, Traditional Academic Secondary Schools and Multilateral Schools. Agriculture, including Home Economics, receives strong emphasis in all these schools.

Students in the Traditional Academic Secondary Schools and Multilateral Schools are exposed to a variety of technical and academic courses during their first three years (Forms 1-3). There is no difference in course offerings for boys or girls; home economics, agriculture, etc., are open to all students, although the more recently constructed Multilateral Schools tend to have much better equipment and facilities for these programs. Upon entering Form4, students must opt for one of three specializations: Arts, Sciences, or Technical. The following two years (Forms 4 and 5) are spent in preparation for the General Certificate of Education, Ordinary Level (GCE O-level) or the Caribbean Examination Council (CXC) certificate. The MOE has begun a shift from the GCE to the CXC, and eventually hopes to use the CXC uniformly. Reasons given for the change are reduced costs and more relevant testing. It is hoped that the CXC, which is in the process of being standardized, will prove to be more effective than the British based GCE.

The program at the Community High School and "Tops of Primary" are more oriented toward technical job preparation. The first two years of the program are spent with 40 percent technical subjects and 60 percent traditional academic subjects. During the last two years these proportions are reversed, i.e., 60 percent technical subjects and 40 percent academic subjects.

The two schools in Guyana exclusively devoted to Home Economics are the Carnegie School of Home Economics and the Frederick School of Home Economics. Both schools offer a broad range of subjects in the areas of food and nutrition and the home sciences. Both programs require two years of study.

In recent years, the Government of Guyana has started sponsoring agricultural education as part of its National Service requirements for youth. The Guyana National Service (GNS) is a paramilitary organization which devotes resources to training and production activities. Trainees are involved in production schemes throughout the country. GNS was established in 1974 and the first post was at Kimbia National Service Center. Training is conducted in such subjects as poultry, swine, cotton, black-eye peas, vegetables, ground provisions, etc., in conjunction with training in military skills and national policy. GNS is divided into training, agricultural, commercial and administrative branches. Training activities are conducted through the Youth Brigade, the Na-

tional Cadet Corps and the Pioneers. Presently, GNS is located at Kimbia (Berbice), Papaya (NorthWest), Tumatumari (Potaro) and Kanawaruk near Tumatumari.

Several schools offer agricultural training at the post-secondary level. The oldest and currently most important of these institutions is the Guyana School of Agriculture which offers both a two-year diploma and one-year certificate in general agriculture. Burnham Agricultural Institute, which is located in the NorthWest Region of the country, is a part of GSA and offers practical training in agriculture at the certificate level. A diploma course for animal health assistants is offered by REPAHA (Regional Educational Program for Animal Health Assistants) at Mon Repos. Finally, college level training in agriculture is now offered by the Faculty of Agriculture at the University of Guyana.

2. Development of Agricultural Education in Guyana and the Present Programs

a. Agriculture in Primary and Secondary Schools

Education in Guyana was originally based on the British system and stressed academic subjects. Until mid-1960, agriculture was not considered an important and necessary part of the school curriculum. It was, however, a subject tested by the teachers' certificate examination and also offered as a course in the Teacher Training College under the topic "School Gardening." Enterprising heads of schools, especially in the rural areas, kept small school gardens, and students wrote this subject at the College of Preceptors examination. Funds during this time were allocated through the MOA and technical assistance was provided through the extension service.

During the 1960's it became apparent to the MOE that there was a need to include agriculture and applied nutrition in the curriculum of the primary and secondary schools. The school was seen as opportune place to teach scientific agricultural practices and good nutrition. Negotiations were started for the formal training of teachers in technical agriculture. In 1968 the first group of teachers entered the Guyana School of Agriculture. Initially, they were to supplement the Agricultural Field Assistants from the MOA who were assigned to assist schools with their agricultural programs.

Teachers of agriculture were responsible to the Officers in charge of science at schools. In 1972, a basic program for agriculture in schools was enacted as law. Around that time, an Officer from MOA was released to work with MOE. His major tasks were to establish a number of school farm plots and assist in the establishment of an agricultural curriculum.

In 1974, MOA released an Extension Officer to join MOE to coordinate and supervise agricultural school programs. Shortly afterwards the funds controlled by MOA for such programs were shifted to MOE. Thereafter, the funding for agriculture in schools appeared under the capital and current budget MOE. It should be mentioned that the Extension Officer functioned as the officer in charge of agricultural programs in MOE.

With the continuous annual training of teachers in technical agriculture at CSA, MOE was guaranteed a regular supply of trained agricultural teachers. With this increasing supply of graduates, the Agricultural Field Assistants supplied by MOA were withdrawn, but MOA still provided technical advice to the various agricultural projects in the schools. In 1975, an officer was appointed by the MOE to supervise the school programs in agriculture. However, a formal structure was not established until 1978, when the present Senior Education Officer for Agricultural Education and various assistants were appointed.

The present program consists of three components--classroom instruction, a work practicum and a youth organization. The classroom instruction involves courses in general agriculture, crop sciences, animal science, agricultural economics and agricultural mechanics. Regarding the latter, it should be pointed out that while agricultural mechanics is taught in most schools, little or no emphasis is placed on acquiring practical shop skills. There is an lack of equipment, facilities, and qualified teachers in this field.

Students are routinely involved in a work practicum on the school farms. Commercial agricultural enterprises are emphasized. Systematic records regarding school activities and home projects are kept by students. Poultry appears to be the dominant enterprise on the school farms. Livestock and produce from the school farms are sold to the community at reasonable prices and students are involved in the marketing.

The youth organization is in an embryonic stage of development. However, most schools have made some effort to organize a club. The stated purpose of the clubs is to promote leadership, citizenship, and cooperativism. Two national meetings are held annually, during which students have the opportunity to participate in leadership activities and to exhibit their produce from school farms.

The Baseline Study team was impressed with the vigor of the agricultural education program in MOE. Everywhere the team went, it was met by enthusiastic teachers and students. The program seems to be working. The major problem seems to be that it cannot expand at the rate desired by officials in MOE. The required personnel and funding does not exist.

b. Home Economics Education

Home Economics started in Guyana with the establishment of two schools, the Carnegie and Fredericks Schools of Home Economics. In 1932, the Negro Progress Convention provided funds to send a student, Vesta Lowe, to the Tuskegee Institute for training in domestic science. Upon her return to Guyana in 1933, she established the first program in Home Economics at the Negro Progress Convention, now known as Fredericks School of Home Economics. Emphasis was placed on courses in cooking, laundry, housekeeping and hygiene.

Fredericks School of Home Economics currently offers a certificate upon completion of all requirements. Present enrollment is 106 students and there are six faculty members including the principal. The curriculum includes courses in needlecraft, dressmaking, embroidery, foods and nutrition, home management, crafts, business, health education, dancing and English. Students completing the school's requirements can take the Secondary School Proficiency Examination.

The same year that the Fredericks School was established saw the founding of the Carnegie School of Home Economics. In 1933, many women and girls from the Working Women's Guild started to make articles, mostly garments and preserves, at the Old Post Office and their homes, and marketed them through the Guild. In 1937, the institution was taken over by the government of British Guinea and the name was changed to Carnegie Trade School. Emphasis was then shifted to teaching. In 1958, the name was changed to Carnegie School of Home Economics, which it retains at the present time.

The present curriculum at the Carnegie School of Home Economics includes the following courses:

1. Household Management Course: This two-year course is intended for students between 14-16 years. Approximately 75 students are enrolled each year. A certificate is awarded after completion of both years. Students specialize in Management, Clothing and Textiles, Food and Nutrition. To enter the school, the students have to possess either a pass in the Secondary School Proficiency Exam (Home Economics), College of Preceptors (Home Economics), GCE or CXC.

2. Catering Certificate Course: this is a one-year course and is intended for students of 17 years or over. They are awarded a Certificate at the end of the course. Approximately 25 students are enrolled annually. Students specialize in Food and Nutrition, and Hygiene. Requirements for entry is the same as for the Household Management Course.

3. Student Teachers: Student teachers from the Lillian Dewar college of Education and In-Service Teachers' Training Program who opt for Home Economics are trained here.

4. Adult Classes: evening classes are conducted for adults in Georgetown and the rural areas; approximately ten classes are held each term. Enrollment is approximate 18 students for each class.

About one-third of the graduates of the two schools of home economics are employed by Government, typically as teachers. The other two-thirds are employed by the private sector in such places as clothing factories, hospitals, restaurants, etc.

In 1975, technical education became compulsory for both boys and girls. Training in Home Economics is offered at the primary level through either a Home Economic Department associated with a single school, or a Home Economic Center, which serves several schools. Training at the secondary level is emphasized strongly and is taught in the first two years.

c. The Guyana School of Agriculture (GSA)

Until 1963, Guyana did not have a national school of agriculture to supply its needs for professionals in agriculture. Professional-level training was done outside Guyana, mainly at the Eastern Caribbean School of Agriculture and Forestry in Trinidad. In 1963, a modest start was made when five residential houses at Mon Repos, approximately eleven miles from Georgetown, were converted into classrooms, dormitories, and a cafeteria. Another building was used for a library and administrative offices and part of a machine storage shed was adapted to provide laboratory facilities for the teaching of chemistry, biology and physics. MOA supplied the teaching personnel. In 1965, the present Principal was appointed and under his leadership, GSA has prospered. A building campaign was started. Over the next decade and a half many new buildings were built and at the present time GSA has modern classrooms, dormitories and other facilities.

The description of the program at GSA would not be complete without a description of its philosophy with regard to commercial enterprises. It is the strong feeling of the Principal, which is consistent with GOG policy, that schools in Guyana should support themselves with commercial endeavors to the greatest degree possible. He has vigorously pursued this policy at GSA by developing the school into what he calls a "vertically integrated" unit striving for self-sufficiency. Great emphasis is placed on having the students involved in the whole production and marketing process--from land preparation to food processing to marketing. Also, students at GSA grow and process the food for the cafeteria themselves. Great emphasis is placed on students working in the processing plant at the school, where Carambola and other fruits, herbs, etc., are processed, packaged, and sold by the students. Broilers, eggs, pork and some milk are sold from the Livestock Farm, as well as fresh fruit and vegetables when they are in season.

Over the last 16 years, GSA students have come from three sources. (See Table 4.1.1). Of the 792 graduates from the school, 494 were private students who had attended the school on their own initiatve. Two hundred seventy-two of these were Diploma students and 222 were Certificate students. Two hundred forty-seven students were sponsored by either one of the Ministries, State Corporations, or other agencies. Most of thee sponsored students (210) were at the Diploma level. There were 4451 foreign students during the 16 year period, 44 in the Diploma program and seven in the Certificate program.

In February 1981, there were 176 students enrolled at GSA, 39 of which were women. The Principal predicts an increase in the next five years to a total enrollment of between 250 and 260 students. Of the 80 additional students, it is expected that 60 will be male and and 20 will be female. Ninety-four students graduated in June 1980, 46 with Diplomas and 48 with Certificates.

As indicated above, GSA offers two types of curricula--a Diploma and a Certificate. The Diploma course is a sub-professional, two-year course designed for graduates of secondary schools and trained teachers, who, upon graduating, will be expected to serve their country either as Agricultural Field Assistants or teachers of agriculture in secondary schools. The Certificate course is a two year course with a strong practical emphasis, and is intended for youths with a full primary education and who have reached the age of seventeen. It is designed to equip young people for successful farming careers.

It should be noted that in actual fact most graduates of the certificate program at GSA do not become farmers. Rather, they usually end up working in Government service doing practically the same sort of work as a diploma graduate. It appears that the distinction between the two types of training is no longer valid. Both types of graduates perform similar jobs after graduation.

Furthermore, it seems that it might be appropriate to reassess the function of the Diploma program at GSA. As indicated above, the program is designed to produce junior-level officers for the agricultural sector in Guyana. It was not designed to feed into baccalaureate programs. In actual fact, a large number of the GSA graduates, both diploma and certificate students, have gone on for university training within a few years after completing GSA. Many attend foreign universities and some are attending the new program offered by the Faculty of Agriculture at the University of Guyana. There is a strong case to be made for the maintenance of the original purpose, the country needs junior-level agricultural technicians. However, if a large portion of the graduates continue to go on for university training, then perhaps GSA should redesign its curriculum to make it more academic. As will be indicated later in this report, there is a need to determine how GSA and UG/FA will relate to each other. Currently, the articulation between the two institutions is not well defined.

Table 4.1.1

DISTRIBUTION OF GUYANA SCHOOL OF AGRICULTURE STUDENTS BY SOURCE, 1965-80

Degree Type	Private Student	Sponsored Student	Foreign Student	Total
Diploma	272	210	44	526
Certificate	222	37	7	266
TOTAL	494	247	51	792

SOURCE: Principal's Report, Sixteenth Graduation Exercises, Guyana School of Agriculture, June 1980.

The curricula for students of both courses include subjects in both the pure sciences and the social sciences, which are taken primarily during the first year of study. In the second year students are exposed to animal science, crop science and microbiology, plant protection, agricultural mechanization and extension education. Practical experience in the laboratories and farms follows closely the instructions received in lectures. There are no areas of specialization in the Diploma or Certificate courses and none are planned at this time. The basic philosophy of GSA is to produce a generalist, rather than a specialist in agriculture.

GSA operates three semi-commercial farms with a total of approximately 180 acres at three different locations. The emphasis is on livestock, market gardens, and field and orchard crops. Under supervision, students engage in all aspects of production in each of the areas, and each student must complete a minimum of eight hours of practical work per week on the farms.

GSA operates a livestock farm at Mon Repos. The major production activities are pork, eggs, poultry, meat and milk. The farm is a viable enterprise and is the principal revenue earner of the school. Students are involved in all aspects of livestock production.

The market garden activity takes place on plots at the school. This area of student activity is limited to the growing of green vegetables and legumes, mainly for the school cafeteria services. The students receive experience in growing the major vegetable crops produced by farmers in Guyana.

Rice is the major field crop produced by the students at GSA. It is grown on 47 acres near the campus. Once again, students are involved in the production of this crop. The paddy produced is sold to the Guyana Rice Board.

The final farming activity involves the production of orchard crops. The farm is located on the Linden highway about 36 miles from the main campus. Approximately 80 acres of land consisting mainly of "white sands" have been put under cultivation growing papaya, pineapple, vine crops, lime, plantain and root vegetables. This farm is planned as a supplier of raw material for the school's food processing unit. Because of the distance from the school, students have only limited involvement with this farm.

Another major commercial activity of the school is the processing of fruits, herbs and other agricultural produce. The school has a modern processing facility housed in a new building. Produce from the school farms are processed and packaged. The products are marketed on a regular basis. Students are involved in these activities. The processing plant is also used as a teaching facility, although the foods typically processed at the school are not major items in Guyana. The emphasis is on processing foods that can be profitable to the school.

The commercial agricultural and food processing activities at GSA have certainly been successful. As will be indicated in a later section of this chapter, the income generated from these activities have made a major contribution to the financial well-being of the school. Furthermore, they fit well with the basic philosophy of the school which promotes the idea that the school should generate much of its own income and not be dependent on the state. However, there is an important question to be faced. Are the commercial activities of the school consistent with its educational objectives? Does the educational program suffer because of the emphasis on making money on the school farms? There is, of course, no rule which precludes the use of commercial activities from the area of teaching. To the contrary, some would argue that having the students involved in financially successful agriculture is a good learning experience. It provides the students with practical experience in a realistic situation. The problem is that when the decisions about the operation of the school farm must be made in terms of financial considerations rather than educational ones, then it is likely that the educational program will suffer. The choice of crops to grow or foods to process or animals to produce will be made in terms of market considerations not educational ones. A teaching farm should provide the students with a wide range of experiences, experiences that will be useful to the students after they graduate. It should provide them with a realistic sample of Guyanese agriculture. The farm should be a laboratory. Students should have hands-on experience with important subjects covered in the classroom. It has been the experience of most agricultural colleges that when the teaching functions of the school farm are given priority over commercial considerations, the farm usually loses money. Crops are grown which are not commercially viable. Foods are processed at a cost higher than the market price. Nevertheless, these unprofitable activities are deemed necessary to the teaching function. It may be that GSA can successfully mix teaching and profit. However, this should be carefully examined and most certainly teaching should be given priority.

The curriculum for the Diploma and Certificate degrees are quite similar. The students in the two programs take many of the same courses. The major difference is that the courses for the diploma students are more theoretical, while the courses for the certificate students are more practical. This, of course, is consistent with the different purposes of the two programs. The diploma program is designed to produce junior-level agricultural officers who need some theoretical scientific training. The certificate program is supposed to produce trained farmers and the emphasis in the curriculum is on practical experience. The problem is that in actual fact the certificate students usually take jobs similar to the diploma students. The differences in curricula are no longer useful. The certificate program should be phased out. These are issues which should be addressed by MOA. It was the judgment of the Baseline Study team that, at least for the present, the distinction between the two programs be eliminated. If in the furuture there is a demand for a program to train farmers, then the Certificate program could be reinstated.

A wide range of courses are currently offered at GSA. The following courses were listed in the Prospectus for the school:

- Agricultural Economics I (Marketing)
- Agricultural Economics II (Farm Management)
- Agricultural Engineering, Machinery and Equipment
- Animal Husbandry I (Poultry)
- Animal Husbandry II (Dairy and Beef Cattle)
- Animal Husbandry III (Swine, Sheep and Goat)
- Veterinary Science
- Biology (Angiosperm Botany, Mammalian Zoology)
- Chemistry
- Cooperatives
- Crop Husbandry I
- Crop Husbandry II (Annual Crops)
- Crop Husbandry III (Perennials)
- Crop Husbandry IV (Sugar Cane and Rice)
- Economics
- English
- Entomology
- Experimental Methods
- Statistics
- Physics
- Plant Pathology
- Rural Sociology
- Soils
- Soil and Water Conservation
- Extension Education
- Farm Bookkeeping and Accounts
- Grassland Husbandry
- Hydrology (including Meteorology)
- Mathematics (Arithmetic, Trigonometry, Algebra, Calculus, Geometry)
- Microbiology
- Basic Food Science and Technology

The curriculum seems to be quite adequate. In conversations with GSA administrators, teachers, ex-students and employers of GSA graduates there seemed to be general agreement that the courses at GSA provide the students with a good background in general agriculture. There was little or no criticism of the curriculum. There have been and presently are a number of GSA graduates at Tuskegee Institute, and it is the judgment of the Baseline Study Team members from Tuskegee that the academic training provided at GSA is of high quality.

c. Burnham Agricultural Institute (BAI)

In March 1973, the BAI which is located at Arakawa (Northwest) was made an affiliate of the GSA for administrative purposes. The School offers a one-year practical course for would-be farmers. It purpose was

to produce farmers who would be willing to settle the hinterlands of Guyana, so the school was located in a remote region.

Applicants are required to be over 17 years of age and have completed a primary education and demonstrate a liking for agriculture. From a small initial enrollment of 22 students, the BAI had 50 students for the 1978/79 academic year.

The curriculum is very practical with much time and emphasis placed on students actually farming. Crops and livestock activities are both promoted. Students are assigned plots of land and are required to use the land in a productive manner. They are graded on how well their plots produce. The students use primarily simple hand tools as opposed to machines.

In spite of the fact that the BAI was established to train farmers, many graduates take jobs with MOE teaching in secondary schools or working with MOA or a State Corporation. Given this situation, it would seem wise to reevaluate the curriculum at BAI. Perhaps it should be made much more academic--a two-year program similar to the one offered at GSA.

d. Regional Educational Program for Animal Health Assistants (REPAHA)

With a loan from the World Bank, REPAHA was started in 1975. For the first few years of operation, REPAHA did not have a campus of its own and had to use facilities from UG, GSA, MOA and the Ministry of Health. In 1978, REPAHA moved to its current facility at Mon Repos. The facilities were built and are owned by the Government of Guyana. The membership of REPAHA is made up of Carribean countries. A list of the members can be found in the section dealing with REPAHA in Chapter III.

Currently, there are 59 students representing ten countries enrolled in the program at REPAHA. There is room for 35 students per class, and there is no plan to increase the program beyond that number. Students obtain a diploma in Animal Health and Veterinary Public Health after the completion of the two year program. The requirements for admission have been modified and are as follows:

1. Students who have passed the General Certificate of Education Ordinary Level in at least three subjects, one of which must be: chemistry, biology, physics, zoology, botany, health science or any other comparable certificate.

2. Mature students recommended by MOA and MOH and who have passed examinations given by the Government.

The curriculum is divided into six terms, each of which is approximately twelve weeks in duration. The students are expected to perform

at a passing level of 60 percent overall. There has been a great deal of revision of the curriculum during the brief history of the school. A current feeling is that perhaps the material is being taught at too high a level for persons who are not going to be veterinarians or Public Health specialists. Thus, the trend is to make the curriculum less technical and more practical. This takes account of the fact that most of the graduates will be working under the guidance of a veterinarian. Furthermore, the program has become much more clinical.

e. University of Guyana--Faculty of Agriculture (UG/FA)

University-level training in agriculture is a new development in Guyana. Until recently, students had to be sent to foreign universities, primarily in the United States and Europe, for baccalaureate and graduate training. The University of Guyana was established in 1963 by the legislature of British Guiana. Initially, students were admitted to degree programs in the faculties of Arts, Natural Sciences and Social Sciences. The Faculty of Education was added in 1967 and the Faculty of Technology in 1969. The Faculty of Agriculture was created in 1977. UG/FA will graduate its first class this year. It is hoped that in the near future most students will receive their agricultural training at UG/FA rather than being sent abroad for study.

The entrance requirements for UG/FA are either:

1. Pass O-level GCE Exams in five subjects and complete two years of work at UG; or

2. Have a GSA Diploma.

From the very beginning, UG/FA has faced major problems with facilities, faculty and finances. It has been unable to offer a complete curriculum itself and has had to enroll its students in related programs. Students take many of their courses in the Departments of Biology and Chemistry. Most importantly, UG/FA has established a cooperative effort with GSA which results in UG/FA students receiving a large portion of their training at GSA. Currently, there are two plans which allow joint study between UG/FA and GSA that lead to a B.Sc. in Agriculture. They are as follows:

1. Students enroll at UG for the first year of study. During the years two and three the student studies technical subjects at GSA. He/she returns to UG to complete the fourth and final year.

2. The student enrolls at GSA for the first three years and transfers to UG to complete the fourth and final year.

UG/FA is also dependent on other Faculties at UG for the training of its students, especially the Faculty of Science. As will be noted later,

UG/FA does not have its own facilities and must borrow them from the other Sciences.

The UG/FA began teaching in the 1979-80 academic year. Five students are expected to receive their B.Sc. degree in 1981. The present enrollment is as follows:

1st year class 25
2nd year class 15
3rd year class 20
4th year class 5
In National Service 25

The present faculty consists of one professor (the Dean), one Senior Lecturer (he is on leave for one year), one lecturer, two instructors and some part-time teachers. The faculty is only involved in teaching. There are neither funds nor release time for faculty research.

There is an Advisory Board for the Faculty consisting of UG faculty and key persons from major agricultural organizations such as MOA and State Corporations. There seems to be substantial interest by the members of the Advisory Board in the establishment of a viable curriculum at UG/FA. The major problems seem to be funding and staffing.

UG/FA has established a complete curriculum for a baccalaureate major in general agriculture. Unfortunately, it has lacked the necessary faculty to offer many of the courses. Furthermore, the lack of a faculty has precluded the development of departments and specialties. However, it is anticipated that when UG/FA receives adequate funding so that it is able to hire an adequate faculty, departments and areas of specializations will be added. The Dean of the Faculty has developed elaborate plans for the expansion of the program once adequate funding is supplied. Also, there are plans for graduate level programs. The existing list of courses is as follows:

Elements of Biology
Elements of Chemistry and Physics
Genetics
Agricultural Economics
Soil Science
Agricultural Entomology
Plant Breeding
Agricultural Parasitology
Animal Breeding
Agricultural Extension Education
Agricultural Microbiology
Agricultural Mycology and Pathology
Biochemistry
Crop Husbandry (Agronomy)
Animal Husbandry (Cattle and Swine)
Agricultural Engineering

Animal Physiology
Crop Husbandry (Horticulture)
Animal Husbandry (Sheep, Goat and Poultry)
Agricultural Chemicals, Weed Science
Statistics & Field Experimentation
Plant Science
Animal Science
Soil Science and Agricultural Chemistry
Soil Science and Agricultural Economics/Agricultural Extension Education.

It was the judgment of the Baseline Study team that this list is a reasonable set of offerings for an undergraduate program. However, it was felt that the current faculty could not possibly offer all of these subjects. Thus, in theory the curriculum is adequate, but in actual fact it is not being offered. Therefore, the current academic program at UG/FA is not up to standard. UG and the Government must decide whether or not a university-level program in agriculture is needed and wanted. If so, adequate funding and staffing must be provided.

3. Resource Allocation for Education

a. Financial Allocations for Agricultural Education

Table 4.1.2 provides information concerning the allocation of financial resources to the Division of Agricultural Education in the Ministry of Education. Over the last five years the operating budget has decreased from G$ 100,000 in the years 1976 - 1978 to only G$ 5,000 in 1980. There seems to be at least two reasons for this development. The first, and probably the most important, is that the adverse financial situation in Guyana has caused Government to make radical cuts in many programs amd agricultural education is one that has been greatly cut. This does not seem to reflect a lack of commitment by Government for the program. Rather, the cuts reflect only the need of the country to economize. Furthermore, it is in keeping with the belief that the agricultural programs in MOE should be self-sufficient. The farms are operated on a profit basis. Since they have been in existence for several years, many of them no longer need major financial support from the Ministry.

The second explanation for the cuts is more positive. It reflects a general belief by Government that many of the institutions in Guyana should move away from government support and generate the monies needed for their operating costs. This particular philosophy has previously been noted with regard to GSA. Along those lines, secondary schools have begun to emphasize agricultural enterprises that provide the best financial return. Poultry production is currently a money-making enterprise in many of the secondary schools.

Table 4.1.2

BUDGET ALLOCATION TO MINISTRY OF EDUCATION---DIVISION OF AGRICULTURAL EDUCATION, 1976-80

Year	1976	1977	1978	1979	1980
Capital	100,000	100,000	100,000	50,000	5,000

Source: Ministry of Education; Division of Agricultural Education

At most of the secondary schools visited by the Baseline Study team, the administrators and agricultural teachers spoke enthusiastically about the income being generated by the school's agricultural activities. Once again, the inherent danger in this is that the profit-making objectives will overshadow the educational function. The school farm can easily become a production unit with the teaching functions secondary. However, given the adverse financial situation in Guyana at the present time, a self-funding approach to agricultural education in the secondary schools may be warranted. Nevertheless, it is beholden on the school officials to guarantee the integrity of the educational program in agriculture. In the long run, it is important for the schools to be less dependent on the profits of the school farms for the funding of educational activities. A bad crop or a drop in market prices could have devastating effects on the program unless its basic operation is underwritten by Government.

The operating budget for the Carnegie School of Home Economics is illustrative of the financial situation for Home Economics in Guyana. Table 4.1.3 contains budget information for this school for the years 1976 to the present. In general, the level of support has gone up over the last five years, from G$ 178,730 for the 1976-77 academic year to G$ 192,686 for the 1980-81 academic year. It should be noted that the budget for the last academic year was the highest for the period, G$ 203,255. In general, it appears that Home Economics receives only modest support. The programs in the secondary schools and at the two special schools are small. One explanation is that these programs have little effect on the economic productivity of the country. Students are not being trained to work in one of the major economic enterprises such as agriculture.

As mentioned before in this chapter, GSA is currently the most important institution for agricultural education in Guyana. Therefore, it is important to examine its financial situation carefully. Table 4.1.4 contains a summary of the 1979 budget for GSA. For that year, the total budget was G$ 1,466,341. Ninety-one percent of it was for recurrent costs and nine percent for capital expenditures. Of the G$ 1,330,604 budgeted for recurrent costs, approximately one-third (G$ 450,000) was allocated by MOA. The other two-thirds (G$ 880,604) was generated by GSA. Table 4.1.5 contains a summary of Government support since 1964. The overall trend has been for increased Government support for GSA. In 1964, the amount provided by Government for recurrent costs was only G$ 40,000. The level of support steadily grew until 1976 when it reached G$ 600,000. The following three years witnessed a 25 percent cut to G$ 450,000. This apparently was due to general budget cuts by Government. The amount was again raised to G$ 600,000 in 1980. The total amount allocated by Government for recurrent costs at GSA for the sixteen year period was G$ 4,985,750, or an average of G$ 311,609. GSA is just finishing its building program and one should expect that a smaller porportion of the funds will be going toward capital experditures in the near future.

Table 4.1.3

OPERATING BUDGET FOR CARNEGIE SCHOOL OF HOME ECONOMICS, 1978-81

Category	Year 1976-77	1977-78	1978-79	1979-80	1980-81
	Current	Current	Current	Current	Current
Salaries	132,330	137,724	151,335	151,335	134,886
Transport	1,900	2,400	2,400	2,400	3,200
Miscellaneous	1,000	250	250	250	250
Uniforms	-	600	600	600	600
Equipment	1,800	2,300	2,300	2,300	2,300
Office Equipment	-	150	150	150	150
Books/Materials	14,000	16,000	16,000	16,000	16,000
Furniture	1,500	1,000	800	800	800
NIS	3,500	3,500	3,500	5,420	7,000
Exhibition	700	500	500	500	500
Rural Areas	5,000	2,300	2,000	2,000	2,000
Evening Classes	12,000	8,000	8,000	8,000	8,000
Electricity	5,000	5,000	5,000	5,000	6,000
Other			2,500	8,000	11,000
TOTAL	178,730	179,724	195,335	203,255	192,686

SOURCE: Carnegie School of Home Economics

Table 4.1.4

BUDGET AND EXPENDITURES FOR GUYANA SCHOOL OF AGRICULTURE, 1979

Source of Funds for Budget	Amount G$	Percent
Government Allocations	450,000	34
Generated by GSA	880,604	66
TOTAL	1,330,604	100

Expenditures	Amount G$	Percent
Current	1,330,604	91
Capital	135,737	9
TOTAL	1,466,341	100

Table 4.1.5

RECURRENT AND CAPITAL BUDGET FOR GUYANA SCHOOL OF AGRICULTURE, 1964-1980

YEAR	GOVERNMENT ALLOCATION			GRANTS & LOANS	TOTAL
	Recurrent	Supplementary	Capital		
1964	40,000.00	-	-	-	40,000.00
1965	105,000.00	-	-	48,000 (Oxfam)	153,000.00
1966	210,000.00	-	-	86,001.60 (Oxfam)	296,001.60
1967	205,000.00	-	-	15,523.20 (Oxfam)	220,523.20
1968	168,000.00	-	-	39,475.20 (Oxfam)	207,475.20
1969	163,750.00	-	60,000	-	223,750.00
1970	155,000.00	-	100,000	-	255,000.00
1971	155,000.00	25,000	120,000	-	300,000.00
1972	155,000.00	43,784	150,000	-	348,784.00
1973	155,000.00	75,000 114,000 (PAI)	200,000	-	544,000.00
1974	424,000.00	-	500,000	-	924,000.00
1975	500,000.00	-	617,000 (Prefab Dorm)	-	1,117,000.00
1976	600,000.00	-	176,541 527,459	-	1,304,000.00
1977	450,000.00	60,000	210,800	39,712 (Ag Bnk)	760,512.00
1978	450,000.00	80,000	160,677	112,425.30 (Endowment)	803,102.30
1979	450,000.00	-	135,737	177,365.92 (Endowment)	763,102.92
1980	600,000.00	-	290,000	-	890,000.00
TOTAL	4,985,750	397,784	3,248,214	518,503.22	9,150,251.22

SOURCE: Guyana School of Agriculture

An additional G$ 379,784 was provided by MOA in supplementary grants during the same period. Government also allocated G$ 3,248,214 for capital expenditures from 1969-80. Another half a million dollars came from grants from Oxfam, loans from GAIBANK and the endowment fund for the school.

The endowment fund was initiated by the former Minister of Agriculture and has thus far received G$ 308,700 in donations. The donors have been diverse and have included State Corporations, private firms, and individuals. The Principal has great expectations for this fund. It is being invested and the interest earned will be utilized by the school.

As indicated above, about two-thirds of the funds are generated by the school itself. A portion of this comes from charges for board and lodging. However, the major portion comes from the sale of produce and livestock from the farm and goods from the processing plant. As indicated before, a basic belief of the Principal and others at the school is that to a large extent the school should generate the monies necessary to run the school. The school has been successful in fulfilling this. Officials at the school were proud that this had been achieved. Students are required to work on the farm and in the processing plant in order to generate income for the school. As previously noted, a potential problem with this approach is that the educational functions of the work practicum could easily be subverted. Assignments in the work practicum might be made in terms of profit considerations and not necessarily in terms of what would provide the best learning experience. This potential problem should be closely monitored. The soundness of the educational program should take priority over the concern by the school to produce income for the school.

The operating budget for REPAHA for the 1980-81 academic year was G$ 622,965. A summary of income and expenses for the school is found in Table 4.1.6. The income for the school was obtained by charging G$ 8,899 per student for the 70 students. These costs were paid by the sponsoring governments. The expenditures show G$ 95,958 budgeted for training, G$ 399,450 for student services, G$ 127,557 for operating costs, G$ 5,000 for equipment and G$ 5,000 for miscellaneous. The above does not cover the salaries of the teaching staff. The WHO/PAHO funding currently provides most of the teaching staff and the MOA provides the Principal, who also teaches. Of course, the PAHO is temporary and must in the future (1984) be replaced by support from the member countries. A number of persons voiced apprehension about this. They indicated that thus far the member countries have not provided the level of support promised and they feared that once the PAHO support terminates the school might face serious financial problems. This situation warrants monitoring. Guyana cannot afford the total cost of operating REPAHA.

The operating budget for UG/FA was G$ 528,867 for the 1979-80 academic year and G$ 548,735 for the present academic year. A breakdown on expenditures and sources of income was not available. However, a lack of sufficient financial support appears to be a key problem with UG/FA. It precludes the recruitment of an adequate faculty, the construction of

Table A.1.6

ESTIMATED BUDGET FOR REPAHA, 1980-81

Income

70 students @ $8,899	=	G$ 622,965

Expenditure

		G$
I.	Training - (School Fees)	95,958
II.	Students' expenses (Board, lodging, etc.)	399,450
III.	Operating Costs - REPAHA	127,557
	TOTAL	622,965

Detailed Budget

I. Training - 1st year students

	Summary
Term I	$13,805
Term II	16,720
Term III	28,106
Second Year Students	
Term I	16,211
Term II	10,576
Term III	10,440
TOTAL	$95,958

II. Students Expenses

1.	Board @ $13.50/day x 31 days/70 students x 10 mos	=$292,950
2.	Protective Clothing-coveralls & lab coats @ $90 = $9,100 times 70. Rubber boots @ $40 x 70 students	
3.	Lodging	12,000
4.	Medical Expenses - $7.00 x 70 x 10; First-Aid, out-patient consultation & medication	41,900
5.	Out-of-pocket expenses--$15.00/month x 70 x 16	80,500
	TOTAL	$399,450

III. Operating Costs - REPAHA

1.	Personnel - administrative	
2.	Miscellaneous*	$5,000.00
3.	Buildings and Compounds - upkeep	2,000.00
4.	Equipment and Machinery**	5,000.00
5.	Telephone	14,000.00
6.	Vehicles - Maintenance and Operation	84,000.00
7.	Electricity	17,000.00
8.	Clinic - Feed	557.00
	TOTAL	G$127,557.00

*Miscellaneous G$5,000.00
**Equipment and Machinery - Maintenance 5,000.00

a building for the Faculty and the development of a school farm. While additional funding will not solve all of the problems at UG/FA, few of the major problems can be solved without it.

b. Education Personnel

When asked to describe their major problems, the officials at most of the institutions involved reported a lack of adequately trained personnel. This section provides an overview of the current staffing patterns at the various institutions.

Table 4.1.7 provides a breakdown of the agricultural education personnel in MOE by position and level of education. There are currently 270 professional level personnel employed by the Division of Agricultural Education. There is one Senior Education Officer and he has a M.S. degree. The three Education Officers have BSc degrees. There are five supervisors, three with BSc degrees and two with Diplomas. The Curriculum Specialist has a BSc. There are currently 260 teachers of agriculture in the system. Fifteen of the teachers have BSc degrees, 140 have Diplomas and 105 have Certificates. The Baseline Study team noted that the ratio between administrative personnel and teachers was good. The program appeared to be well managed. Virtually all of the personnel in the Division are graduates of CSA. Officials reported that the quality and relevance of the training at CSA was satisfactory. However, it was noted that many in the Division needed additional training. The SEO was particularly insistent on the need for his staff to have advanced training at the BSc and M.S. levels. It is difficult to ascertain the degree to which vacancies exist within the Division. The administrative positions seem to be staffed at authorized levels. The staffing at the school level is difficult to judge. Whether or not there is a teacher of agriculture at a given school is out of the hands of the Division. Just because certain schools are without agricultural teachers can not be interpreted as meaning that vacancies exist at those schools. Agricultural teachers may be missing because some other subjects have priority. Teachers in those fields would be employed at the expense of not hiring agricultural teachers.

Agriculture is a relatively new subject in the schools. It is the judgment of the Baseline Study team that MOE has made significant progress in staffing this program with qualified personnel. While the level of staffing and the amount of training of the current staff may not conform exactly to the expectations of administrators in the program, they are nevertheless better than one might expect in this situation. The staff is well-trained and the agricultural education is expanding at a rapid rate. Much progress has been made in only a few years.

Table 4.1.8 provides data concerning the staffing of the Division of Home Economics in MOE. Currently, all but one of the administrative level positions in the Division are vacant. The only position filled is the Senior Education Officer-Technical. Vacancies exist for an Assistant Chief Education Officer-Technical, an Education Officer and two

Table 4.1.7

EDUCATIONAL LEVEL OF CURRENT ADMINISTRATIVE STAFF AND TEACHERS - MOE AGRICULTURAL DIVISION

Position	MA/MS	BA/BS	Diploma	Certificate
Senior Education Officer (Ag)	1			
Education Officers (Ag)		3		
Supervisors (Ag)		3	2	
Curriculum Specialist/Supervisor (Ag)		1		
Teachers			100*	150*

*Estimates

Table 4.1.8

STAFF POSITIONS IN THE DIVISION OF HOME ECONOMICS, MOE BY LEVEL OF TRAINING

Position	Filled	Vacant	Level of Training
Assistant Chief Education Officer, Technical		1	BS or MS
Senior Education Officer Technical	1		MS
Education Officer, Home Economics		1	BS
Home Economics Supervisor (2 positions)		2	Trained Teachers Certificate and/ or Certificate in Education or BS

SOURCE: Division of Home Economics, Ministry of Education

Supervisors. This program started in 1975 at the beginning of the current economic crisis in Guyanaand has never been staffed adequately.

Table 4.1.9 presents staffing information for the two Schools of Home Economics. The staff at the Carnegie School has a large number of vacancies. Currently, the school has an acting Principal. There are 15 positions for instructors; eight are filled with Diploma or Certificate level personnel and seven are vacant. The situation at the Fredericks School is much better. There are only three positions and they are filled.

At the present time, GSA seems to be experiencing fewer problems with staffing than the other educational institutions. Table 4.1.10 contains a listing of the current professional positions and the educational training of the persons employed in them. There are currently no vacancies. The school is headed by a Principal who has a M.S. There are two Principal Lecturers, each with a B.Sc. There are two Senior Lecturers. The Senior Lecturer, who serves as the manager of the Food Processing Unit, has a Diploma in Nutrition. The Senior Lecturer, who is the Farm Manager at Mon Repos, has a Masters degree. There are six Lecturers; three have Masters degrees, two have B.Sc.s and one has an A.I. Ed. The Officer in Charge at EAI has a Diploma from GSA. The Assistant Farm Manager for the farm on the Linden highway is also a Diploma graduate from GSA. The Administrative Assistant and Personnel Officer both are Trained Teachers. GSA utilizes several part-time lecturers from MOA and the State Corporations. There are also a couple of teachers on study leave at the present time.

The administration at GSA seemed to be satisfied with both the number of professional level personnel at the school and their training. No major deficiencies were noted. Likewise, the Baseline Study team felt that this institution had fewer staffing problems than any other major unit in the REE system. This is not to say that there is not room for improvement. The Principal mentioned specific types of training that he thought would be useful for selected staff members. Nevertheless, GSA appears to be staffed with an adequate number of trained professionals. It is the judgment of the Baseline Study team that GSA should have as a goal in the next few years the upgrading of the educational level of its faculty. The faculty would be greatly strengthened if more of the teachers had B.Sc.'s and Masters.

The staffing situation at REPAHA is much more critical. When the school was established, the plan was for PAHO to supply about half of the teaching staff and the rest was to come from the Carribean member countries. Currently, PAHO is supplying three professional level personnel, a project manager and two lecturers. They are all veterinarians. The Government of Guyana is providing the Co-project Manager, who is also the Principal. He is a recent graduate from the School of Veterinary Medicine at Tuskegee Institute. There are two positions for Lecturers that were to be filled by member countries. They are both vacant. Currently, classes are being taught by Guyanese veterinarians who have full-time jobs in the Ministry or at LJDCO. These part-time lec-

Table 4.1.9

POSITIONS FILLED AND VACANT FOR CARNEGIE PERSONNEL

Position	Filled	Vacant	Training Level & Institution
Acting Principal	1	0	Degree or Certificate in Home Economics plus exposure to administration
Vice Principal	1	1	A Diploma or Certificate in Home Economics obtained from a recognized university, college or institution of similar status after a three year course of full time study plus five post-qualification teaching experience
Instructor I	1	0	Experience in teaching any subject in Home Economics or catering, or Certificate or other qualifications of equivalent standing
Instructor II	0	2	Trained Teacher Certificate plus two or three years at the training college or other institute of similar status and at least one year teaching experience
Instructor III	3	3	Trained Teacher Certificate or a recognized Certificate/ Diploma in any branch of Home Economics after at least one year of full time study or trained Teacher Certificate in Home Economics plus four years of teaching experience in Home Economics
Instructor IV	4	2	Degree and Diploma or Certificate in Home Economics from a recognized institution after three years of full time study or higher national Diploma in institutional Management or Catering

POSITIONS FILLED AND VACANT FOR FREDERICKS PERSONNEL

Position	Filled	Vacant	Training Level & Institution
Acting Principal	1	0	Trained teacher exposure to administration
Trained Teacher	1	0	Trained teacher's Certificate
Acting Teacher	4	0	Certificate from Technical school with skills

Table 4.1.10

FACULTY AND FULL-TIME STAFF AT THE GUYANA SCHOOL OF AGRICULTURE BY LEVEL OF TRAINING, 1981

Position	Level of Training
Principal	M.Sc.,B.Sc., (Cornell) Trained Class 1 Teacher
Principal Lecturer - Admin.	B.Soc. (UG) Dip. Ag. (ECIAF)
Principal Lecturer - Tech.	B.Sc. Dip. Ed. (UG). Dip. Food Tech. (UWI)
Senior Lecturer - Manager Food Processing Unit	Dip. Com. Nutrition (UWI), Adv. Cert. Ag. Business Management (USDA), trained class 1 teacher
Senior Lecturer - Farm Manager Special Projects	M.Sc. (Tuskegee), B.Sc. (LSU), Dip. Agri. (GSA)
Lecturer - Manager Highway Farm	M.Sc. B.Sc. (Purdue), Dip. Ag. (GSA)
Lecturer - Manager Rice Farm	B.Sc. Agri. Ed. (LSU) Dip. Ag. (GSA)
Lecturer - Manager Livestock	B.Sc. (Southern Ill.) Dip. Ag. (GSA) Cert. Poultry Husbandry (Kesteven College)
Lecturer - Library Supervisor	A.I.Ed. (London) trained class 1 teacher
Lecturer	M.Sc., B.Sc. (Kerala Univ.)
Lecturer	M.Sc. (West Virg.) B.Sc. (UG)
Officer in Charge (Acting) Burnham Agricultural Institute	Diploma (GSA)
Asst. Farm Manager (Highway Farm)	Diploma (GSA)
Admin. Assistant/Warden	Trained Teacher
Personnel/Public Relation Off.	Trained Teacher

SOURCE: Guyana School of Agriculture

turers are paid on a hourly basis and certainly do not perform the functions of regular staff members. The problem is a difficult one. It is the responsibility of member countries to supply staff, but thus far, Guyana is the only country that has provided personnel. The crisis will occur a few years from now when the PAHO team leaves. A summary of the current positions at REPAHA is found in Table 4.1.11.

The educational institution with the greatest staffing problem at the present time is UG/FA. Table 4.1.12 provides a summary of the present situation. The only full-time permanent faculty member is the Dean. He is listed as the specialist in Entomology/Nematology. The agricultural economist is the wife of a foreign diplomat who is temporarily stationed in Guyana. Both the Dean and the agricultural economist have Ph.D degrees. The other two faculty members are temporary and have only BSc degrees. This is certainly not a faculty adequate for a university level program. The Dean appears quite frustrated about the situation. He indicates that the problem is due both to a lack of funds to hire needed personnel and the lack of sufficiently trained personnel in the country. It is the feeling of the Dean that the current situation cannot continue much longer. Government needs to make a commitment to fund the program and provide graduate training abroad to a future faculty. Until this training is finished, the Dean feels that the University must hire expatriates to teach in the program. The Baseline Study team is of the firm opinion that the staffing problem at UG/FA should be given top priority by UG and key Government officials immediately. A quality B.Sc. program at the University could provide much of the needed manpower for the agricultural institutions in Guyana and at a much cheaper cost than sending students abroad.

c. Educational Facilities, Equipment and Supplies

The adequacy of facilities at the various educational institutions varied considerably. When the Baseline Study team visited each of the institutions, the team members attempted to assess the status of current facilities, and the need for additional facilities, equipment and supplies. The ratings of the team are based on only a cursory review supplemented by those of the staffs at the several institutions. Therefore, the ratings presented below should not be taken as a definitive statement of the needs of the institutions. As plans are developed to address the needs of the educationagricultural programs, there will be a need for a more precise assessment of the adequacy of facilities, equipment and supplies.

The team visited several secondary schools offering vocational agricultural programs. The facilities varied by the type of school. At the more recently constructed Bladen Hall Multilateral School, the buildings were cement block and well-maintained. This school was in the process of expanding its farming operation which included the establishment of additional poultry and beef units. This school was experiencing some problems with equipment and three of its four tractors had

Table 4.1.11

FACULTY POSITIONS ALLOCATED, FILLED AND VACANT FOR REPAHA, 1981

Position	Number Allocated	Number Filled	Number Vacant	Percent Vacant
Guyanese/Caribbean Personnel				
Co-Project Director-Principal Lecturer	1	1	-	-
Lecturers	2	0	2	100
PAHO/WHO Personnel				
Project Director	1	1	-	-
Lecturers	2	2	-	-
	6	4	2	33

Source: REPAHA personnel

Table 4.1.12

CURRENT FACULTY MEMBERS AT UNIVERSITY OF GUYANA, FACULTY OF AGRICULTURE, 1981

Area of Specialization	Ph.D	MA/MS	BA/BS	Others
Entomology/Nematology Dean of Faculty	1			
Agricutural Economics	1			
General Biology			1	
General Chemistry			1	

SOURCE: University of Guyana, Faculty of Agriculture

been in the repair shop for some time. Facilities at St. Stanislaus College, a traditionally academic school, were much older though in good repair. The major problem at St. Stanislaus was a drainage problem which hampered the agricultural program. The Peterwangting Community High School farm was well kept but its resources were much more limited than the two schools mentioned above. The classroom used for agricultural education was poorly lighted and in need of repair. This school was also experiencing drainage problems. At the LBI Government Primary School, both the facilities and the scope of the agricultural program were decidedly more limited than at the other sites. There was only a small vegetable plot and one poultry unit. Repairs to the school building were underway, but they did not appear to be sufficient. At all four schools, a new MOE policy, which allowed schools to reinvest farm profits, was mentioned as a method for financing the improvement of existing facilities or the building of new ones. Supplies for the agricultural program seemed adequate, especially feed and supplies for the livestock activities.

Table 4.1.13 provides ratings of the facilities, equipment and supplies at the Carnegie and Fredericks Schools of Home Economics. In general, the Carnegie School received favorable ratings with regard to facilities. The exceptions were the laboratories and the library, which were judged inadequate. The laboratories were ill-equiped and the library lacked sufficient holdings. On the other hand, the facilities at the Fredericks School received unfavorable ratings. There is a need to improve these facilities in the near future. With regard to equipment and supplies, both schools needed additional classroom furniture, textbooks, office supplies, laboratory equipment, audio/visual materials and library books and journals. Neither school had adequate equipment or supplies.

Of all of the institutions invovled in agricultural education in Guyana, CSA had the best facilities and had fewer problems with equipment and supplies. There are eleven buildings on the main campus, including administrative offices, classrooms, laboratories, a food processing unit, an auditorium, a cafeteria, and girls and boys dormitories. Three staff houses are presently under construction. The farm has a small office and sales room, a hog unit, three broiler houses, two layer houses, an area for chicken plucking and processing, a milking parlor with stancheons and a small milk room, as well as a storehouse for feed. A new chicken processing unit is being built with a walk-in refrigerator already in use. Also under construction is a unit to produce biogas from the manures of the various livestock. An upgrading of the dairy facility is planned.

Table 4.1.14 contains a rating of the facilities at CSA. The major instructional facilities were adequate. The storeroom on the livestock farm needed replacing and male residence halls were both in need of general repair. There is no farm shop and that one is needed. With regard to equipment, much of the farm equipment and farm vehicles were in need of repair. Office supplies and equipment seemed adequate, but some effort is needed to improve the holdings of the library. In summary,

Table 4.1.13

RATING OF FACILITIES AND EQUIPMENT AT CARNEGIE SCHOOL OF HOME ECONOMICS

Rating Scale: Ø=non-existent; 1=excellent; 3=adequate; 5=inadequate

Item	Description	Number	Rating	Needs
Classrooms	spacious rooms, large enough for classes	8	3	Additional class rooms
Offices	nicely divided for space and movement	2	3	-
Conference rooms	not applicable	Ø	Ø	-
Auditorium (Assembly Hall)	large room that doubles during the day as a classroom	1	3	Larger room, properly equipped with stage and proper lighting for presentations
Laboratories	most are large enough to provide proper work space	4	5	-
Storerooms	small but adequate	2	3	-
Library	inadequate space, very limited on book as well as journals	1	5	More space, greater number of volumes of books and journals, and magazines
Dining Halls	adequate for food preparation and service	1	2	-
Faculty Housing (closed)	furnished apt. with sitting room, kitchen bedroom and bathroom. Quite adequate.	1	2	
Sport Facilities (outside facility)	Outside sports only	-	3	-
Classroom equipment (desks, chairs, blackboard, etc.)	non-laboratory classrooms had basic components of chairs, desks		3	Need desks

Table 4.1..13 continued

	and blackboard		
Office Equipment	Most equipment in good working condition except adding machine	3	Appropriate office chairs, more filing space
Textbooks	Shortage on numbers; sometimes not able to purchase the desired levels because of gov't regulations	5	Increased supply of textbooks from Minister of Education
Laboratory Equipment	Limited equipment, most of it is old.	5	Additional equipment needed; more modern equipment needed
Audio/visual	Provided through Ministry of Education	Ø	Audio/visuals to be housed in the school
Library books and journals	Limited books, very limited journals	5	Additional volumes needed, increased amounts and kinds of journals

Table 4.1.14

RATING OF FACILITIES, EQUIPMENT AND SUPPLIES AT THE GUYANA SCHOOL OF AGRICULTURE

Rating. Ø=non-existent; 1=excellent; 3=adequate; 5=totally inadequate

Item	Description	Number	Rating	Needs
Classrooms	large auditorium used regular classrooms	1 2	3 3	adequate
Conference room	none noted as such			
Offices	principal's suite, plus clerical rooms, plus 8 individual offices	9+	2	reasonably good staff facilities
Auditorium	large upstairs, may hold 150-200	1	3	adequate
Laboratories	not well observed	1	3	
Storeroom	on Livestock Farm	1	4	needs replacing
Farm Shop	no farm shop per se	n/a	5	need a farm shop
Other farm buildings	broiler houses layer houses	3	3	watering equipment
Library	small room in administration building	1	3	
Residence halls	Residence I=68 males Residence II=28 males Residence III=39 females	1 1 1	4 4 3	general repairs on both male residences; better bathroom and washing facilities needed
Kitchen and Dining Hall	located beneath residence II	1 1	4 3	better facilities, but generally clean; dining hall expansion under way
Faculty Housing	3 being built, others rent own houses	3	n/a	not yet finished
Sport Facilities	Field for football,etc.	1	3	adequate

Table 4.1.14 continued

Recreation Room	Former Assembly Hall. Has a hardwood floor for games; could have a basketball court.	1	3	adequate
Food Processing building	A center for processing, packaging, etc., fruits and other items from GSA farm	1	3	needs new pressure cookers hook up; otherwise adequate for small scale processing
Utility shop	for students on campus	1	3	adequate
Classroom equipment (desks, chairs, etc)	chairs, desks, blackboard	2	3	adequate
Office equipment	typewriters and duplicating machine	n/a	2-3	reasonably adequate
Textbooks	n/a			
Laboratory equipment	n/a			
Audio/visual	on order from a donor			expected to arrive soon
Farm vehicles	most large equipment in disrepair		5	need a machine shop and sheds
Seed, fertilizer, etc				
Other agricultural tools & equipment	various		4	much of it in disrepair
Library books & journals	bare minimum		3-4	numbers and variety

the situation at CSA was basically adequate. Some attention should be given to the repair of specific buildings and equipment should be routinely repaired.

BAI, which is part of CSA, was also judged adequate. The school and all the facilities are new. The oldest building is the classroom-office building. It appeared clean and in good repair and the dormitories are adequate. There are a number of farm buildings for livestock and farm supplies. They also appeared to be in good condition. There is a shortage of faculty housing and this has caused some dissatisfaction. Obtaining supplies and equipment presents a problem primarily due to the fact that the school is located in the hinterland and transportation is difficult. The lack of supplies and equipment does adversely effect the educational program.

The facilities at REPAHA are also new and appear to be quite adequate. There is an administration buiilding, residence hall, laboratories, a lecture hall, clinic building, animal ward and paddock and various small buildings and sheds. There are needs expressed for additional storage facilities, a cafeteria (Students currently take their meels at the Central Agricultural Station which is one-half mile away), and a library. On the whole, the equipment, supplies and other materials seem adequate. The laboratories seem to be well-equipped and of sufficient quantity to provide the students good training . The audio visual materials on had are impressive both in quality and quanity. The pharmacy room is stocked with sufficient drugs to treat most medical problems. The school has acquired an impressive number of current veterinary and animal science books and journals from various countries and professional organizations. Two major problems were noted. First, the poor condition of the road from the highway to the school resulted in the school's vehicles routinely breaking down. Secondly, this resulted in the school being unable to maintain a regular schedule of field trips.

The Faculty of Agriculture at UG currently lacks its own facilities. Rather, it uses classrooms, offices and laboratories belonging to other academic areas. These facilities are in good condition. (See Table 4.1.15.) However, the interests of the Faculty of Agriculture are always secondary to those of the Faculties who have control over the facilities. The Dean of the Faculty of Agriculture indicated that there is certainly a need to have separate facilties. He argued that a building should be constructed and that a school farm should be established. The question arose as to where the Faculty should be located. Some argue that it should be housed on the campus of UG; other say that it should be located at Mon Repos. There are good reasons for both choices. Locating it at the UG campus would mean that it would not be physically separated from the other Faculties and that students would not experience transportation problems when taking classes in other departments. On the other hand, the Mon Repos location would be a good choice for several reasons. First of all, the Faculty could share some of the more costly facilities such as the school farm, laboratories and scientific equipment with CSA. Secondly, UG/FA

Table 4.1.15

RATING OF EQUIPMENT, SUPPLIES AND FACILITIES AT UG/FA

Rating scale: Ø=non-existent; 1=excellent; 3=adequate; 5=inadequate

Item	Description	Number	Rating	Needs
Classroom equipment (desks, chairs, blackboard, etc.)	various, shared	n/a	2	adequate
Office equipment	various, shared	n/a	2	adequate
Textbooks	practically non-existent, faculty must lecture or handout duplicated materials	n/a	5	there is a desperate need for recent textbook for students or as reserve in the library
Laboratory equipment	various, shared	n/a	2	adequate
Audio/visual equipment	shared	n/a	3	adequate
Farm vehicles			Ø	
Seed, fertilizer, etc.			Ø	
Other agricultural tools & equipment			Ø	
Library books & journals	very meagre holdings	n/a	5	there is a desperate need to upgrade the holdings pertaining to agriculture
Classrooms	shared w/other dept.		2	adequate
Laboratories	shared w/other dept.		2	adequate
Offices	shared w/other dept.		2	adequate

Source: University of Guyana personnel

students currently do two years of study at GSA and it makes sence to have the two schools housed at the same location. Finally, the Mon Repos location is currently used for most of the other agricultural research and educational programs in the country--GSA, the Central Agricultural Station and REPAHA. The location of UG/FA is an important issue and much thought should be put into this decision. The consensus of the Baseline Study team was that the Mon Repos location was the most desireable.

With regard to supplies and equipment for UG/FA, several points should be made. First of all, the Faculty lacked any equipment or supplies necessary to operate a school farm. Consequently, the curricuulum taught at the UG campus is largely theoretical. The students receive the standard classroom lectures, but do not receive any practical experience. Textbooks and library holdings were deficient. Laboratory equipment and supplies and those for the classroom and offices were adequate.

In summary, most educational institutions appear to have adequate facilities, equipment and supplies. The major exception is UG/FA. The Government should give high priority to solving this problem. Government needs to provide adequate facilities and equipment for a university-level program in agriculture.

4. Education Linkages and Networks

Each of the educational institutions have established linkages with other major Guyanese agricultural organizations and some international institutions. A summary of the various linkages for each of the educational institutions is found in Table 4.1.16. The Division of Agricultural Education--MOE reported a strong linkage with the MOA. The agricultural education program in the secondary schools has a close working relationship with the extension program of MOA. There is a particularly strong linkage between Agricultural Education and GSA. Most of the agricultural education teachers in the secondary schools received at least some of their formal training at GSA. Furthermore, the Senior Education Officer for the Division is on the governing board of GSA. The Division also reported linkages with GUYSUCO, GRB and GMC.

The Division of Home Economics in MOE reported regular contact with the Ministry of Health through its nursery school program. The Division supplies technical information concerning nutrition and has a strong tie to the UG, which offers a degree in Home Economics. Also, home economics teachers cooperate with the Extra-Mural Department at the University. While there is no formal tie with GSA, there is an informal one in as much as most of the home economics teachers are trained at GSA. There is a strong relationship between the Division and MOA. The Division is used to promote the program of MOA. Infrequently, the Division is called upon by GMC to help market a particular product.

Table 4.1.16

MINISTRY OF EDUCATION LINKAGES

	MOE	MOA	MOH	GSA	REPAHA	UG	GUYSUCO	GRB	GMC	GPC	LIDCO	Farmer Groups	Foreign Universities	Professional Organization
MOE-Ag		S		S			S	S	S					
MOE-HE	S		W	S		S			W					
GSA	S	S			S	W	S	S	W	W	M	W	W	W
REPAHA		S			S				S		S		W	S
UG-FA	M	M		S			M	M	S	S	M	M	W	M

S = strong
M = moderate
W = weak

GSA indicated that it had close ties with a number of insitutions and organizations. One of the major reasons for this is that at the present time GSA supplies most of the junior-level personnel for the various agricultural organizations in the country. As noted above, there is a close tie with MOE because GSA supplies most of the teachers for agricultural education and home economics. There is a close linkage between GSA and the Central Agricultural Station(MOA) which is adjacent to the school. Some of the part-time teachers at GSA come fro CAS. The school is also housed close to REPAHA and it was reported that there is close cooperation and sharing of facilities. Finally, it was indicated that there is a close tie between some of the State Corporations, especially GUYSUCO and GRB, and GSA. Officers from those corporations are on the Board for GSA and a number of GSA students are sponsored by them. Furthermore, GUYSUCO supplies the lecturer for the sugar sections of courses and GRB provides seed and technical assistance for rice. Weak linkages were noted for the other State Corporations, farmer groups, UG-FA and foreign universities.

REPAHA indicated a strong linkage with UG where students use the library and are provided with some part-time instruction in the basic sciences. There is an especially strong linkage with the Division of Veterinary and Livestock Sciences--MOA. The Division provides many of the part-time lecturers in veterinary medicine, as well as technical assistance. LIDCO also provides lecturers and the use of animals and facilities at its ranches and the milk plant. One of the parttime lecturers is provided by the ham and bacon factory operated by GMC. There is close contact with farmer groups because students regularly visit farms with extension officers of the Division of Veterinary and Livestock Sciences. Weaker linkages were noted between REPAHA and foreign universities and professional organizations.

When assessing the linkages between UG/FA and other institutions an important and interesting finding was made. UG/FA noted a particularly strong linkage with GSA. This is understandable since UG/FA students receive much of their formal training at GSA. However, GSA had reported that the linkage with UG/FA was weak. Apparently, there is not a reciprocal relationship between the two institutions. GSA is very important to the operation of UG/FA, but the reverse is not true. This puts UG/FA at a disadvantage when dealing with GSA. The Dean noted that UG/FA is a new institution and has not had the opportunity to develop many strong linkages. However, he noted that there are also strong linkages with GMC and GPC. Moderate linkages were reported for a number of other organizations including MOA, GUYSUCO, GRB, LIDCO and farmer groups. Currently, the linkages with foreign institutions and organizations are weak.

5. Expected Output of Educational Institutions and Placement

The Baseline Study team attempted to determine the expected output of each of the educational institutions and the expected employment of the graduates. Since the study was concerned primarily with the training of professional level personnel data were not gathered for the secondary levels.

Table 4.1.17 shows the expected number of graduates at the Carnegie school of Home Economics by area of specialization for the present year. Seventy-one students are expected to graduate in household management, 35 with a specialty in catering, six student teachers from Lilian Dover College and 22 in-service teacher trainees. Typically, graduates are employed in entry level positions in both government and the private sector, most frequently in garment factories, hospitals, school systems, restaurants, textile mills and homes, although some set up a business of their own or form cooperatives. Approximately 35 percent of the graduates are employed in government jobs and 65 percent in non-government positions. Graduates hired full-time receive Civil Service ratings through the Public Service Ministry. Some are employed parttime and do not receive a Civil Service rating. These are employed through the Ministry of Labor. Graduates generally receive Civil Service ratings of grades one or two on a scale of Grade 1, Grade 2, Grade 3, Senior Officer, where Grade 1 is the lowest and Senior Officer the highest.

GSA graduated 94 students in 1980, 46 with Diplomas and 48 with Certificates. Graduates of GSA are employed by MOE as teachers, by the various Divisions of MOA as junior-level officers and in various posts by the State Corporations. The major employers of GSA graduates are shown in Table 4.1.18 which shows the distribution of sponsored students by sponsor between 1970-80. MOE sponsored well over half of the students at GSA during that eleven year period and all 161 were diploma students. GUYSUCO sponsored 20 diploma level students and GRB funded six diploma students and one certificate student. Guyana National Service sponsored ten students, Interior Development Department 18, and a number of other organizations fewer than 10. A number of foreign students were sponsored by their governments or CIDA. Although MOA did not sponsor any students, it is probably the largest employer of GSA graduates. Many of the unsponsored graduates are employed by MOA.

As indicated in a previous section of this chapter, the employers of GSA graduates tended to rate the training of the graduates highly. They indicated that, by and large, graduates have sufficient training and perform well on the job.

With regard to output, an additional point should be made. The function of the diploma program is to produce junior-level agricultural officers and the function of the certificate program is to produce trained farmers. The present program does not seem to be fulfilling these functions. Within a couple of years of graduation from GSA a number of graduates continue their education and obtain university degrees. While this shows initiative on the part of the students, it means that

Table 4.1.17

PROJECTED GRADUATES BY SPECIALTIES FOR CARNEGIE SCHOOL OF HOME ECONOMICS

Specialty	Projected No. of Graduates
Household Management	71
Catering	35
Student Teachers (Lilian Dewar College)	6
Student Teachers (In-Service Teacher Training)	22

Source: Carnegie School of Home Economics Personnel

Table 4.1.18

SUMMARY OF GSA SPONSORED STUDENTS BY SPONSOR

SPONSOR	NO. OF STUDENTS		
	Diploma	Certificate	Total
GUYSUCO	20	-	20
Ministry of National Development	1	-	1
Guyana Rice Board	6	1	7
Canadian International Dev. Agency	21	5	26
Ministry of Education	161	-	161
Guyana National Service	2	8	10
Prisons Department	1	4	5
Guyana Defense Force	2	3	5
Guyana Police Force	-	1	1
Ministry of Economic Development	1	1	2
Public Service Ministry	6	-	6
Interior Development Department	2	16	18
Berbice River Extension Project	1	-	1
Commonwealth Secretariat	3	-	3
GALA	-	1	1
Office of the Prime Minister	1	2	3
GSA Corporation	4	-	4
Transport & Harbours Department	1	-	1
Guymine	1	-	1
Belize Government	-	9	9
Bahamas Government	6	-	6
St. Kitts Government	2	-	2
Antigua Government	1	-	1
Grenada Government	2	2	4
TOTAL	254	44	298

Source: GSA personnel

within a few years of their graduations they are no longer junior-level officers. Given the fact that there is an acute shortage of personnel at the junior level--Agricultural Field Assistants, Agricultural Technical Assistants, etc.--the diploma curriculum at GSA should be restructured as a terminal course. This is especially true since UG/FA is now operating. UG/FA should train the students who are qualified for university level training and GSA should provide training for technicians. An additional factor is that very few of the certificate students have become farmers. Most of them have taken jobs with MOA or a State Corporation very similar to those held by the diploma students. GSA should consider phasing out the certificate program and have all students complete the diploma curriculum.

Projections of the number of graduates that can be expected from UG/FA are difficult to make at the present time because the program is so new. However, if the development of the Faculty proceeds as currently anticipated, UG/FA should begin graduating approximately 40 students per year with the B.Sc. degree in the next few years.

There were 140 applicants for the UG/FA program this year (1980-81), but the Dean indicated that enrollment will be limitd until the Faculty is developed. When fully staffed, the program is expected to admit approximately 40 students per year. In spite of the current understaffing of most agricultural organizations in Guyana, a glut of unemployed or underemployed agriculturalists could develop if enrollments are allowed to expand too rapidly. Table 4.1.18 contains the projected outputs of UG/FA for the next few years.

The first class of graduates are receiving degrees in general agriculture. This is due to the fact that both the faculty and the student enrollment are too small for specialization. However, it is anticipated that the class graduating in 1982 and thereafter will specialize in plant science, agricultural economics and extension, soil science and animal science. The estimated number of graduates in 1982 is three. That number is expected to increase to 13 in 1983 and to 30 - 40 in years after that. Once again, these projections are based on the assumption that UG/FA will be able to hire an adequate faculty.

It is expected that the graduates will be employed by MOA, MOE and the State Corporations. Officials in these organizations seem to be retaining a wait and see attitude with regard to UG/FA graduates. However, if they do not perform satisfactorily then this will result in Guyana having to continue to sponsor many students abroad for study. Most employers anxiously awaiting the day when UG/FA can produce a sufficient number of quality graduates in agriculture.

Table 4.1.19

PROJECTED OUTPUT OF UG/FA GRADUATES, 1981-1985

Year	Expected BS Graduates
1981	5
1982	3
1983	13
1984	30 - 35
1985	40

Source: UG/FA personnel

6. Projected Personnel Needs

The most critical shortage of professional personnel in the agricultural education system at the present time is at UG/FA. The Dean is the only full-time regular faculty member. The rest is either part-time or temporary. In order to staff the projected program adequately, including teaching and research, the Dean has projected a need for Ph.D level faculty members in the following fields:

- Plant Breeder, Genetics
- Microbiologist
- Biochemist, Plant Physiologist
- Plant Pathologist, Virologist
- Agricultural Engineer
- Rural Sociologist
- Farm Management Economics
- Animal Nutritionist
- Animal Husbandry, Specialist Sheep, Goats, Poultry
- Soil Scientist
- Horticulturist, Fruits
- Horticulturist, Vegetables
- Agronomist, Crops
- Agronomist, Plantation Crops
- Agriculture Statistics

It is the judgment of the Baseline Study team that the list represents the specialities necessary to staff an adequate program. The UG/FA program is currently less than adequate primarily because it does not have the needed faculty. The staffing of UG/FA should be given top priority when formulating programs to upgrade the ERT system. This is going to be a difficult task. There is currently not trained professionals in the country to take these positions. This means that the Government should sponsor graduate training abroad for promising candidates. In the meantime, it may be necessary to staff many of the positions with foreign nationals. Such a program might well be supported by an international donor. However, GOG should show a greater commitment to UG/FA before involving an international donor. It could support additional faculty positions and provide separate facilities for the program.

The staff at GSA is adequate, according to the Principal, and should only expand in proportion to the expected increase in student enrollment, e.g. if 260 students enroll, six to seven more faculty are needed: one full-time teacher for Mathematics and related fields, one teacher for Dairy Science and the others not specified. The Baseline Study team noted a need for a teacher in farm mechanics. Also, it is felt that GSA should upgrade the level of its faculty by sponsoring its faculty for additional graduate training.

REPAHA is primarily staffed by WHO/PAHO personnel at the present time. Guyana and the other Carribean countries must provide several faculty members for the program in the next few years. This may prove difficult. Guyana has a shortage of veterinarians and is presently not

able to fill all of the positions in MOA. Guyana should obtain commitments from other Carribean members to provide faculty members. This should be done well before the WHO/PAHO team departs.

The personnel needs for MOE are less clear. The Division of Agricultural Education has undergone a period of growth in the last few years. This will probably continue for the next few years. Most of the additional positions can be filled by graduates from GSA. However, there is probably a need for some to have university level training either at UG/FA or a foreign university. The Home Economcs program is less robust. There are several vacant positions at the present. However, there does not seem to be a major shortage of personnel in this Division.

7. Faculty Salaries, Promotion Structure and Professional Development

It was acknowledged that salaries for staff and teachers in the Division of Agricultural Education, MOE are inadequate. However, salaries of personnel with similar educational background are, by and large, comparable with those of employees in the private sector. The annual salaries for the past four years are found in Table 4.1.20. They have, by and large, remained constant over that period of time. The SEO earned G$ 11,352 each of the four years. The EOs had a small increase in salary from G$ 9,876 in 1977 to G$ 10,668 in 1980. The average salary for supervisors dropped from a high of G$ 8,040 in 1979 to a four year low of G$ 7, 236 in 1980. Curriculum specialists earned G$ 7,452 in each of the last three years. The average salary for teachers rose from G$ 5,436 in 1977 to G$ 6,000 in each of the last three years.

Table 4.1.21 contains salaries for personnel at the Carnegie School of Home Economics. The present salary is far below that paid in the private sector and there is a general dissatisfaction with the salary schedule, regardless of rank and qualification. Even though dissatisfaction does exist, it does not seem to have an effect on retention of qualified personnel. Salaries ranged from a low of G$ 4,152 for the lowest level of Instructor to G$ 11,616 for the Principal of the school. Home Economics teachers in other MOE positions make comparable salaries.

The Teacher In-Service Commission, an autonomous body that works closely with MOE, is responsible for teacher evaluation. Promotion is based on merit, qualifications and years of service. Faculty seem to be satisfied with this system of evaluation. Most of the teachers are young and do not have many years of service. Few are at a point in their careers where they would expect promotion. The system seems to functions adequately. However, it should be monitored to determine what happens after most of the teachers have five or ten years in the system and begin to expect promotion.

Table 4.1.20

SALARY SCHEDULE FOR MOE-DIVISION OF AGRICULTURAL EDUCATION PERSONNEL, 1977-1980

Position	Annual Salaries (G$) 1977	1978	1979	1980
Senior Education Officer	11,352	11,352	11,352	11,352
Education Officers (Ag)*	9,876	10,044	10,188	10,668
Supervisors (Ag)	7,512	7,896	8,040	7,236
Curriculum Specialist (Ag)	7,116	7,452	7,452	7,452
Teachers**	5,436	6,000	6,000	6,000

*Average
**Estimates
Source: MOE, Division of Agricultural Education

Table 4.1.21

SALARY SCHEDULE FOR MOE, DIVISION OF HOME ECONOMICS PERSONNEL, 1981

Position	Rating	Minimum	Maximum
Principal	A29		11,616
Vice Principal	A26	7668	10,776
Instructor IV	A24	7152	10,224
Instructor III	A21	6276	8,556
Instructor II	A16	4980	6,708
Instructor I	A12	4152	5,688

Source: MOE, Division of Home Economics

The MOE Divisions identify topics for seminars and workshops to provide in-service training to faculty. Faculty are permitted to attend other workshops related to teacher training sponsored by organizations other than MOE. To encourage faculty attendance in training activities, reimbursement for travel is provide for out-of-town meetings. MOE personnel participate in the Guyana Teachers' Association.

There is a general feeling among MOE faculty and staff that there should be more opportunities for professional development, especially opportunities for further education. A common goal of MOE personnel was to do undergraduate or graduate training. The Public Service Ministry provides some scholarships upon the advice and recommendations of administrators in MOE.

Table 4.1.22 contains the 1981 salary schedule for GSA. A five percent across-the-board increase is expected in the near future. Faculty members are also provided monthly allowances. The yearly salary for the Principal is G$ 15,000 per year with a duty allowance of G$ 2,400. This is comparable to the salaries for high level personnel within MOA. The Principal Lecturer receives an annual salary of G$ 13,620 with an allowance of G$ 2,400. Salaries for Lecturers vary by grade and range from G$ 6,120 to G$ 12,600 with duty allowances between G$ 1,500 and G$ 1,800. Lower level personnel, such as the Assistant Farm Manager and Technical Assistants receive salaries between G$ 4,392 and G$ 8,472 with allowances between G$ 600 and G$ 1,200. GSA salaries compare favorably with MOA salaries. They are reported to be lower than those in State Corporations. The team spoke with ex-faculty members who said they left GSA and took employment with a State Corporation in order to make more money. The salaries are well below those in neighboring countries. The only other fringe benefit is subsidized housing for some senior staff: rent for housing is calculated at a certain percentage of their salary. Three new staff houses are being built. There is obviously dissatisfaction with low salaries, but there seems to be less at GSA than at the MOA and MOE. There does not seem to be as many problems of recruitment and retention as at other government organizations.

There is no explicit promotion structure at GSA. There are yearly increments in salary until one reaches the top for his/her rank. Promotion to a higher rank requires advanced education either at UG/FA or at a foreign university.

There is a provision for study leave at the GSA; generally, one becomes eligible for it after five years of service. However, this is determined case by case according to needs and availability of funding. The Livestock Farm Manager has just returned from study leave in the US. The Baseline Study team feels that this is a good incentive. Faculty members expressed an interest in continuing their educations. If GSA offers this opportunity, it will serve as an incentive for talented scientists and teachers to remain at the school.

Table 4.1.22

SALARY SCHEDULE FOR GSA PERSONNEL, 1981

Position	Yearly Salary Minimum		Maximum	Yearly Allowance
Principal	15,000			2,400
Principal Lecturer	13,620			2,400
Senior Lecturer	10,860	-	12,600	1,800
Lecturer/Manager	6,120	-	10,680	1,800
Lecturer	10,680	-	11,520	1,500
Asst. Farm Manager	4,392	-	8,472	1,200
Technical Assistant	4,400	-	5,916	600

Source: GSA personnel.

While staff are free to belong to professional organizations, funds are limited to travel to meetings. The only meetings usually attended are those within CARICOM countries. The same situation exists for workshops and seminars. Participation is encouraged but funds are lacking for support.

There has been virtually no research and publishing in the past. However, the Principal has recently indicated that all the senior faculty should take on some kind of research projects and publish the results. Plans are underway to begin a research project on optimum broiler density in broiler houses, and the Manager of the Carambola Orchard has begun spacing trials with the Carambola trees. The Baseline Study team feels that faculty with research interests should be encouraged to participate in research projects at CAS.

As in most of the REE system in Guyana, salaries at UG/FA are low, creating low morale and difficulties with the recruitment and retention of staff. The current salary schedule applying to the UG/FA is found in Table 4.1.23. The salary for a Professor ranges from G$ 20,220 to G$ 24,420 with a yearly increment of G$ 600. Salaries for other ranks vary from a high of G$ 23,220 for Readers to a low of G$ 6,120 for Instructors. These salaries are relatively high for Guyana. Therefore, if UG/FA ever gets its program established, it should be in a favorable position to attract qualified faculty. Of course, the above salaries are subject to a high progressive income tax.

Promotion is based on education, teaching, research, and in some ranks, public service. Detailed criteria have been developed, however, these had not been strictly applied to UG/FA last year. However, the criteria, according to the Dean are now being implemented.

There is provision at the UG/FA for further advanced training as follows:

- three months earned study leave after three years of continued service;

- sabbatical leave of one year after six years of continuous service.

There is also provision for participation in professional organizations, both domestic and international, including funds to travel to meetings, workshops, etc. Approval depends upon the needs of the school and availability of funds. Because of the heavy teaching load, there is little time for research and publishing. It is hoped that there will be more opportunity for these activities in the future.

Table 4.1.23

SALARY SCHEDULE FOR UG/FA PERSONNEL, 1981

Position	Yearly Salary (G$)	Yearly Increment
UA1: Professor	20,820 - 24,420	600
UA2A: Reader	19,620 - 23,220	600
UA2: Senior Lecturer	15,780 - 19,020	540
UA3: Lecturer I	9,000 - 11,880	480
UA4: Assistant Lecturer	6,120 - 8,640	420
UA5: Instructor	6,120 - 8,640	420

Source: UG/FA Personnel

8. Summary of Strengths and Weaknesses

Each of the educational programs reviewed by the Baseline Study team has important strengths and weaknesses.

-The program in the Division of Agricultural Education is new but growing rapidly. There is good leadership and most schools have good programs. There is a need for additional equipment and a course in farm mechanics.

-The major problem in the Division of Home Economics is a lack of personnel and financial support. This program has not received the same level of support as the program in the Division of Agricultural Education.

-GSA is the most important and strongest institution offering agricultural education in the country. It has a strong faculty and good facilities. The team found that the two degree programs no longer serve their stated functions. It is recommended that the Certificate program be terminated because presently most of the Certificate graduates are taking jobs similar to Diploma graduates. There is a need to assure that commercial agricultural activities of the school afford students with relevant experiences.

-REPAHA has experience difficulty staffing its program with Guyanese or other member country personnel. The WHO/PAHO team is due to depart in two years. It is crucial that this program be solved before that time.

-UG/FA is the educational program with the greatest number of problems. It lacks staff and facilities. However, there is a need for a unversity-level program in agriculture in the country. UG/FA should be given high priority by GOG and international donors.

B. Agricultural Research in Guyana

1. General Overview of the Agricultural Research System in Guyana

Agricultural research in Guyana is primarily of the applied type and is, in almost all cases, geared directly to immediate production problems rather than to longer term basic research. Furthermore, most of the research is related, either directly or indirectly, to crop production and more specifically to rice and sugar. Because of their commercial importance and their long history of development, research on rice and sugar is better organized, better funded and better staffed than other research units. However, with the emphasis on self-sufficiency in food production that has been one of the central goals of Government since independence, there is an increasing need for agricultural research on a wide range of commodities. Increased research is necessary if Guyana is to achieve its production goals in these crops. Unfortunately, a number of major production schemes have been initiated without adequate research and these projects have routinely experienced serious unanticipated problems. Research is typically sought after the problems appear, rather than performing research prior to the start of a project in order to anticipate them.

In addition to the lack of research on key crops other than rice and sugar, there has also been insufficient research in cultural practices in noncoastal areas of the country, areas which the government has targeted for settlement and agricultural development. If the interior is to be successfully developed agriculturally, there is an urgent need to do basic agricultural research in the targeted regions. The settlers should be provided with proven technical packages for key crops. Answers to key research questions should be found before additional manpower and/or Guyana's limited financial resources are further invested in new crops or in the agricultural development of new lands.

Presently, encouraging research work of the type needed has been initiated by MOA and other research groups. There is important research being done to evaluate different crop species in terms of their adaptability to various growing conditions in the country. Similarly, limited but important research is being conducted in the sectors of livestock, forestry and fisheries. There is a need to build on the strengths of existing research programs and to expand them to address the major problems limiting agricultural development in Guyana. Such an effort is needed, if Guyana is to achieve its goal of self-sufficiency in food.

The potential for an adequate agricultural research program exists in Guyana. There is a small, but well-qualified cadre of researchers that has demonstrated its proficiency in research. However, there is presently no centrally planned or administered research program. Rather, the research effort is highly fragmented, located in independent and functionally autonomous organizations which lack the necessary mechanisms to assure the needed articulation between units. Given Guyana's

limited resources, both financial and human, it cannot afford the luxury of autonomous agricultural research organizations. This fragmentation, coupled with the shortage of upper and middle level research personnel, and the lack of necessary equipment and supplies, severely inhibits the development of the type of agricultural research program necessary to provide the needed scientific support for Guyana's development efforts.

Presently, the research program is divided among various units in MOA, the several State Corporations involved in agriculture, and a few other organizations. Within MOA, research is being conducted by the sub-Ministries of Fisheries, Forestry, and Hydraulics, as well as three of the Divisions of the Ministry of Crops and Livestock-Soil Science, Crop Science and Veterinary and Livestock Science. Six State Corporations are involved to varying degrees in agricultural research--GUYSUCO, GRB, MMA-ADA, LIDCO, GPC, and GFL. On a limited basis, agricultural research is also being conducted by the Agriculture Group of the Institute for Applied Science and Technology of the National Science Research Council, GSA, and UG-FA.

2. Historical Development of Agricultural Research Programs

Formal agricultural research was initiated in British Guiana in 1881 for the purpose of breeding sugar cane varieties resistant to diseases that were adversely affecting the industry. Since the research centered on sugar, it was beneficial primarily to plantation agriculture rather than to private producers. However, as the British developed a research program, other crops, such as copra, cotton, pineapple, mango and fodder grasses were included. Many of the research findings from these latter efforts were of use to non-estate agriculture.

An important development in Guyana, which had an effect on agricultural research, was the creation of the Department of Agriculture in 1927. The Department's primary purpose was to provide the necessary structure for agricultural research and extension. The Department was designed to service the increasing numbers of private farmers in the colony. Agricultural Experiment Stations were established and staffed with officers who were to produce needed information about indigenous crops to be used in an extension program. Typically, each Station had a laboratory, experimental plots and livestock facilities. Irrigation and drainage problems were also of particular concern in the early days of the research program and scientists conducted research to find solutions to them.

Despite many setbacks during the early stages of growth and development, there have been numerous research accomplishments. Plant breeding research has produced several varieties of sugar cane and rice which are disease resistant, produce high yields and are adapted to tropical conditions. Income generated from sugar and rice exports have been used to fund research on these two crops. Recent years have witnessed increased research in other crops. Emphasis has been placed not only on higher yields but also on the adaptability of various varieties to the

wide array of soil and climatic regimes found in Guyana, including hinterland areas, where currently little agricultural production exists.

3. The Current Research Structure in Guyana

a. Ministry of Agriculture (MOA)

Research in the Ministry of Agriculture is financed directly by the state. The funds are a part of the annual budget of the Ministry and are divided into recurrent allocations for programs of a routine or continuous nature, and capital allocation for new projects and major equipment purchases. Research projects are also funded through regional and/or international organizations and these are typically restricted to research on a particular crop or technology.

(1) Ministry of Crops and Livestock

Research in crops, soils and livestock in Guyana started with the establishment of the Botanic Gardens in 1878. This research function was shifted to the Board of Agriculture and later to the Ministry of Agriculture.

(a) Division of Crop Science

The Division of Crop Science is headquartered at the Central Agricultural Station (CAS) at Mon Repos. It has three sections: Agronomy, Plant Protection and Seed Technology, each headed by Production Managers. The Principal Agricultural Officer is responsible for the overall administration of the Division. The Division has been very active in developing new technology. Considerable research is being done on fruit crops, including varietal selection and adaption, fertilizer trials, plant propagation, disease and insect identification, resistance screening, etc. The Division works very closely with small farmers in improving the entire farming system. They are concerned with everything from proper land preparation and crop establishment to harvesting. Most of the research conducted in Guyana, apart from the State Corporations, is directly or indirectly conducted with either this Division or the Division of Soil Science. The researchers are quite knowledgeable about most of the problems and have a clear understanding of the needed course of future research efforts. Their most limiting contraint is the lack of management. The Baseline Study team noted that currently there is a lack of adequate management of existing personnel and resources. This is partly due to the fact that there has been a large turnover in Division personnel in recent years. The Division seems to lack direction. This problem must be solved before the Division can make efficient use of additional personnel and equipment.

(b) The Division of Soil Science

The main station of the Division of Soil Science is also located at CAS at Mon Repos. It was initially established by MOA in conjunction with the Plant Science Laboratory. In 1973, the Division was upgraded with funding from USAID in order to increase the efficiency of soil and plant tissue analysis.

In 1975, the soil science research was removed from the Crop Science Division, and a separate Division of Soil Science was established. Between 1979-80, the Soil and Plant Testing Laboratory underwent major reorganization and is presently an excellent research and analysis facility.

Major research activities in soil science have focused on soil survey and classification, soil management, soil fertility evaluation, physical and chemical characterization of soils, soil testing and plant analysis. Most of the soils in Guyana have been surveyed and numerous survey reports have been published. Prior to 1979, the 1938 classification system was used with some components of the 7th approximation. As a result, many of the soil surveys are written in such a way that it is difficult to develop land use planning and management based on the surveys. These facts have made it necessary for the Division to rework many of the old surveys based on soil taxonomy. The soil fertility trials carried out prior to 1975 were compiled by T. Hubbard and have served as the basis for present fertilizer recommendations. Currently, work is in progress to improve this data base for growth response curve analysis. Up to 7000 soil samples are annually processed by the Soil and Plant Testing Laboratory to provide a basis for fertilizer and lime recommendations for farmers, parastatals and other institutions in Guyana. The present rate of sample analysis per day is 198 with an expected increase to 396 samples per day in 1981. This rate is probably sufficient for the current needs of the country.

The specific objectives of the Division was defined in 1979 as follows:

- maintaining a national soil classification system and an inventory of soil resources in Guyana;
- executing national soil and land use surveys and describing the genesis, morphology and classification of soil resources;
- interpreting soil characteristics for various land use, management and planning purposes, and making recommendations for the best possible use of soil resources;
- providing physical, chemical, mineralogical and biological information about soils;
- developing programs and recommendations for the appropriate

economic and ecological use of fertilizers, lime and other amendments.

- providing chemical information on the labile nutrient pool and toxic conditions of soil and plant tissue material;

- providing information on chemical residues in the environment as a result of agricultural development.

Four publications since 1979 provide evidence that the first four of these objectives are being addressed. Seventeen experiments have been designed that focus on objectives four and five. Technical and financial support required to ensure timely completion of these experiments is strongly recommended. There was only limited evidence that the last two objectives have been specifically addressed.

(c) Division of Veterinary and Livestock Science

The Division of Veterinary and Livestock Science in its early organization within the Ministry of Agriculture was divided into two separate Departments, the Veterinary Division and the Livestock Division. In 1973, the two divisions were merged into a single unit, headed by a Principal Agricultural Officer. From its inception, the purpose of the Division has been to develop the livestock industry of Guyana and to increase productivity of food and work animals.

The overall research thrust of the Division is to develop new and improved technology in order to provide the nation with more and better qualities of meat and dairy products. However, in recent years, the research output has been almost nonexistent primarily due to a shortage of research staff and increased administrative and other responsibilities of the present staff. Despite this situation, limited research programs are being conducted in areas such as breed adaptation, range management, grazing intensity and other applied management activities associated with livestock production. Although limited applied research data are collected, it is not done in a systematic way. The Division is at a point where either a major effort is made to revitalize the research program or it will be lost. The livestock industry is too important to Guyana to allow this to happen.

(2) Ministry of Fisheries

In 1952, the International Bank for Reconstruction and Development recommended that a brackishwater fish culture station be constructed in what was then the colony of British Guiana. Upon this recommendation, Dr. W. H. L. Allsopp, the Fisheries Research Officer, established the Onverwagt Fish Culture Station. Several years later, a freshwater station was built in the Botanic Gardens in Georgetown. Both stations were funded by the colonial government.

The Onverwagt Station was designed as a commercial demonstration unit to test the feasibility of brackishwater fish culture in Cuyana. The production technique selected utilized naturally stocked indigenous fingerlings. Research was carried out on the ecology, growth rate. food habits and adaptability of these fish to pond culture.

Initial research work was primarily descriptive of biological, chemical and physical parameters of the selected production system. Water quality analysis, water budgets, ecological studies of food chains, food habits of fish entering the ponds and basic production studies were conducted. Mixed culture systems composed of mullet, snook, croaker and tilapia were also developed. Hassar (Hoplosternum littororale) was introduced to the Onverwagt Station in 1977. The initial stock was captured from local rivers by fishermen. Growth rate studies were conducted, but the data were not reported.

Most of the Onverwagt Station was under repair in 1980. The remaining ponds were utilized to produce fingerlings for the GUYSUCO project; hence very little research was conducted. Efforts are presently underway to build up viable queriman (Mugil brasiliensis) stocks to conduct production trials. Plans for current work at the Potanic Gardens Stations are primarily for the production of tilapia fingerlings (Tilapia nilotica female, Tilapia mossambica-male hybrid). Induced spawning trials of hassar continue utilizing pituitary from the curass (Selenaspis herzbergi). A peacock bass brood pond is also being established for future production of fingerlings.

Unfortunately, in recent years, many of the trained research personnel have left for overseas employment or employment with GUYSUCO. The current research program is less than adequate. It has steadily deteriorated in quality over the last decade and a half. Major inputs are required if the research in this Ministry is to be restored to an acceptable program. Emphasis in the research program should be on brackishwater culture techniques instead of fresh water tilapia. Brackishwater species are more acceptable in the market than tilapia, and water control structures already exist for construction of facilities. The Onverwagt Station, if renovated and supplied with adequate research personnel, could serve as the demonstration and research center for this endeavor.

(3) Ministry of Forestry

The Forestry Department was created in 1953 as a division of MOA. Since then, it has been housed in the Ministries of Agriculture, Forests and Mines, Agriculture and Natural Resources, and most recently, under the Ministry of Energy and Natural Resources.

On July 1, 1979, the Forestry Commission was created by the Guyana Forestry Commission Act as an autonomous corporation. During the first eighteen months of its existence, the Chief Executive Officer served as

Chairman of the Board and Conservator of Forests. In January 1981, a Minister of Forestry was appointed.

The primary function of this ministry is to manage and control the exploitation of the forests in Guyana. Although the Forestry Commission Act specifies research as one of its major functions, staffing limitations have relegated forestry research to a relatively low priority. There is only one Nursery, located in the Essequibo District, which is conducting species trials on the white sands. However, no additional funds have been allocated for research at this facility.

(4) Ministry of Drainage and Irrigation

Under the reorganizational plan of 1981, the Hydraulics Department was upgraded to the Ministry of Drainage and Irrigation. Its function, as it relates to research, is to assist the various research organizations in operating and maintaining drainage and irrigation systems. That is, the Division conducts no basic research on drainage and irrigation of its own, but rather functions as a support unit to other research units under MOA. The services of this Ministry have been particularly important to sugar and rice research where the problems of drainage and irrigation are fundamental.

b. The State Corporations

There are several state corporations involved in agricultural research. While they are administratively independent of the various units in MOA, formal and/or informal linkages exist. For example, the Soils Division under the Ministry of Crops, Soils and Livestock, conducts soil analysis for Guyana Rice Board. Similarly, the Plant Protection Section of the Crops Division is responsible for monitoring all crops for plant pathogen infestations. However, the state corporations are responsible for designing and implementing their own research programs, usually independently of any of the other state corporations and MOA.

(1) Guyana Sugar Corporation (GUYSUCO)

A historical review of agricultural research reveals that Guyana was one of the first countries in the Western Hemisphere to embark on a breeding program for sugar cane. Higher productivity and resistance to specific pests and diseases were the chief concerns. This work was initiated by Harrison and Jenman in the late 1800's and resulted in the development of several locally-bred varieties.

In 1920, the Guyana Sugar Planters' Experiment Station was established for breeding sugar cane and improving cultural and manurial practices. This developed into a testing and selection station for new va-

rieties. Soils research--always conducted to a small degree on individual estates--was shifted to this new central research unit.

During the early 1970's, the sugar industry was nationalized and the Guyana Sugar Corporation (GUYSUCO) was established, combining eleven major production estates along the country's coastal area and incorporating the Guyana Sugar Planters' Experiment Station. The Sugar Experiment Station is housed on the LBI Estates southeast of Georgetown.

The major thrust of the research program continues to be the development of high-yield varieties with disease and insect resistance. Other research activities include development of chemical ripeners, soil surveys and classification, design, construction, modification, and field testing of agricultural equipment.

GUYSUCO produces 90 percent of the country's sugar cane. The remaining ten percent is produced by small farmers. There is no formal transfer of research results to these farmers, but information is made available to them on request. GUYSUCO however, does require persons using the company's grinding facilities to adopt a specific technical package. This package is based on research results and is transmitted to the farmer via the Cane Farmers Committee.

The Other Crops Division of GUYSUCO is relatively new, having been established approximately three years ago. Crops grown include field corn, black-eye peas, cassava, onions, oil palm, cucumbers and cherries. Although there is no formal research on these crops per se, there is some experimentation on planting schemes involving these crops to provide a year-round production system. In addition, there is some fish culture using flooded fields and ponds to raise hassar and tilapia. The Other Crops Division recognized the need for research and is in the process of formulating a program. This Division is new and has added several important enterprises over a very short period of time. It is important that it initiates research programs for each of the crops. This is especially true of oil palm which represents a major investment in time and money.

(2) Guyana Rice Board (GRB)

GRB conducts most of the rice research in Guyana primarily at the Mahaicony-Abary Rice Development Scheme (MARDS). Other stations involved in research are East Perbice, Black Bush Polder and Essequibo Coast. The major areas of research are varietal development and improvement, seed production and certification, water management, weed control, soil fertility and plant nutrition, entomology and pathology. Research in these areas is expected to continue and there are plans to develop a soil testing laboratory independent of that at CAS at Mon Repos. Several varieties of rice have been developed and released to the farmers by MARDS, the most popular one being the S+N variety.

Research at the MARDS station centers on varietal component and agronomic aspects of crop culture, including weeds, diseases and insect problems. The MARDS station is divided into seven sections:

(a) Varietal Improvement - The function of this department is to breed and select superior varietal strains.

(b) Seed Production - This department produces and processes foundation seed.

(c) Agronomy - This section studies water management and weed control, soil fertility, plant nutrition and certified seed production. After a breeding line has been selected it is then handed over to the Agronomy section where further research is done to determine response to fertilizer and herbicide, seeding rates and general response to cultural practices in the field.

(d) Entomology - The purposes of this section is to test all of the advanced breeding lines coming from the crop improvement section for resistance to certain rice pests. Research includes the development of a screening program to identify more efficient pesticides and determine varietal resistance to various pests. In addition, since many storage problems originate in the field, ways are studied to control pests at harvest time.

(e) Pathology - This section studies major rice diseases such as blast and brown leaf spot.

(f) Engineering - This section provides support for the others by maintaining the necessary equipment.

(g) Common Services - This section provides labor and services to the other sections.

The MARDS station is one of the better research units in Guyana. At the present time, it has serious problems with staffing. Nevertheless, its research program is well-developed. In spite of this, there were some problems at MARDS. The seed production unit lacked proper storage and testing facilities for foundation seed. Also, more laboratory equipment is needed. Existing equipment is poorly maintained because of a lack of trained support personnel.

Research at the Black Bush Polder Station is centered around "The Small Farm Development Project" funded by USAID and operated jointly by GRB and the International Research Institute (IRI), a USAID contractor. The aim of the project is to improve rice production in the Black Bush Polder area by identifying constraints to production and providing solutions. Research is being planned in the areas of farm machinery, water control, and agricultural practices. The project also has extension and farm management services. The IRI team has only recently started its work and no research findings are yet available.

(3) Mahaica-Mahaicony-Abary Agricultural Development Authority

The MMA-ADA was established by an act of Parliament in 1977 in order to coordinate the development of the MMA-area. The overall objectives of agricultural development in the MMA-area are:

- food production through efficient use of land and water resources;
- establishment of an agricultural management structure.

The research program for rice, pasture, corn, soybeans, black-eye peas, coconuts and ground provisions is directed at the following topics:

- pasture agronomy;
- soil and water testing;
- environmental impact;
- seed production, storage and processing;
- agricultural engineering, especially mechanization and farm power land and water management, tillage, harvesting and storage of grains.

MMA-ADA is a new organization and does not yet have an operational research program. However, it has been able to hire staff and is assured of funding from its IDB project for research activities. One can expect this organization to develop a viable research program over the next few years.

(4) Livestock Development Company (LIDCO)

LIDCO was founded in 1975 for the purpose of developing the beef and dairy cattle industry. An increasing amount of research is conducted in the areas of animal breeding and adaptation, range management, and pasture and forage development. Applied research was observed in visits to the Ebini and Moblissa stations. Factors such as stocking densities, rates of establishment, grazing rates and intensity and nutritional quality are being tested as a means of increasing milk production in the brown sands area. The quality and quantity of this research should be strengthened. Currently, it is rather incidental to production. Given Guyana's need to increase whole milk and beef production, LIDCO, in concert with the Division of Veterinary and Livestock Sciences should greatly expand the research effort.

In addition some applied research is being conducted at the feed lot operation at Kabawer on cross-breeding. There is great potential for a study at this site.

As LIDCO increases the supply of whole milk, research is needed in the area of consumer attitude acceptance. It is likely that a nutritional education program will have to be developed and extended to the general public before wide acceptance is realized.

(5) Guyana Fisheries Limited (GFL)

GFL commercially exploits marine fish and shrimp resources. The primary area of research has been in processing fish bycatch at the Kingston Plant. The Plant was funded initially in 1979 by IDRC to identify suitable species and develop methods of manufacturing new fish products. Some of the research needs for the trawling operations are:

- Conservation practices that allow for refurbishing the fishery. Regulation of license fees by the Ministry of Fisheries plays a role in this area, but patroling to prevent overfishing is also needed.

- Investigation of alternative uses of bycatch. CIDA has initiated a study on the economic feasibility of brining in the entire bycatch in order to reduce the length of time at sea. Collector cum-factory vessels may be a feasible alternative.

c. Other Agricultural Research Related Agencies

(1) National Science Research Council

The Agriculture Research Committee of the National Science Research Council is primarily an advisory group. At the present time, it is not involved in any type of research. However, some research efforts are planned for the near future. Recently, the Institute for Applied and Scientific Research was established and housed in a new facility on the campus of the University of Guyana. There is a Division of Agricultural Research headed by a Ph.D in Soil Science. There is currently discussion about having the NSRC provide an overall umbrella for agricultural research. The Agriculture Research Committee could formulate a comprehensive plan for the nation, setting priorities and coordinating efforts between the various units. This idea has been discussed with a number of researchers in the MOA and the State Corporations and there is some support for it.

(2) Guyana School of Agriculture (GSA)

GSA is primarily a teaching institution. For the past two years, however, its faculty has been strongly encouraged to conduct applied research, as a part of class activities. One instructor has approximately two hectares of fruit trees and is evaluating such factors as varietal fruit quality differences, plant density and pruning effects. There are some informal ties with the Soils Division of the Ministry of Crops, Soils and Livestock on some of their projects. Investigations have been carried out on poultry and swine management. It is the judgement of the Baseline Study team that GSA should increase its research activities, and that this should be done by cooperating with the researchers at GSA. It was also the team's judgment that, at least at the present time, GSA should not initiate its own independent research program; rather, scientists at GSA should collaborate with existing research organizations.

(3) University of Guyana (UG)

The UG Department of Agriculture is presently not engaged in any type of research. Although offering the B.Sc. in agriculture, the Department is not as yet fully staffed. The faculty members will be involved primarily in teaching with research as secondary priority.

(4) Agricultural Research Stations

There are currently eight Crops, Soils and Livestock Research Stations in Guyana, seven of which are directly involved in some type of agricultural research (see Table 4.2.1) and operate under the MOA. There are also the research stations for rice and sugar operated by GRB and GUYSUCO.

(a) Central Agricultural Station, Mon Repos (CAS)

The Station was established in 1936 by the MOA in order to centralize administrative and laboratory research facilities. CAS functions in research and support roles for agricultural utilization of soils and land resources. The chief research areas are:

- Crops: varietal trials on fruits and vegetables; improvement of breeding and cultural practices.

- Plant Protection: diseases; insects and nematodes; resistance screening.

- Soils: inventory of soil resources; natural soil and land surveying; soil genetics; morphology and classification of soil resources; soil testing.

Table 4.2.1

SUMMARY OF LOCATION & ACTIVITIES AT EACH AGRICULTURAL STATION

Identity	Location		Activity
Central Agricultural Station	Mon Repos, ECD	Coastal	Crops/Soils/ Plant Protection/Livestock
Kairuni Research Station	Soesdyke, Linden Highway	Forested brown sands	Crop Research
Long Creek Station	Soesdyke, Linden Highway	Forested white sands	Crop Research
Ebini Research Station	Intermediate Savannahs	Brown sands savannahs	Livestock/ Crop Research
Central Horticultural Station Timehri	Demerara River Timehri	Riverain area	Crop Research Plant Propagation
Onverwagt Fish Culture Station	West Coast, Berbice	Coastal	Fisheries Research
Botanic Gardens Fish Culture Station	Georgetown	Coastal	Fisheries Research
Waini Apiaries Station	Northwest District	Hinterland	Agriculture

Livestock: breed selection of dairy cattle, beef cattle, sheep, goats, swine, and poultry; sale of breeding stock to farmers; pasture improvements.

These units are encouraged to work together in producing research packages.

CAS has the responsibility of coordinating research activities at the agricultural sub-stations. Projects at these stations are often funded and staffed through CAS.

(b) Ebini Research Station

This station was established for crop, soil and livestock research for the intermediate savannahs. Crop facilities comprise a Field Station and approximately 100 hectares of land. Major research in beef production on native and improved pastures has been performed here in the past. This facility has been recently converted to a commercial unit under the Livestock Development Company Ltd. (LIDCO). In addition, nutrition studies on sheep and goats are conducted here.

(c) Central Horticultural Station - Timehri

This is essentially a propagation station for orchard and perennial crops. In addition, some crop research specific to the particular soil type is being carried out. There exists a need to strengthen technical support at the propagation station. Research into propagation techniques on crops grown under indigenous conditions should be conducted.

(d) Onverwagt and Potanic Gardens Fish Culture Stations

Both of these field stations are concerned with research to develop inland fisheries. There are 1.2 hectares of research ponds at Onverwagt and approximately 0.3 hectare at the Botanic Garden (see Ministry of Fisheries for further details). Currently, the Ministry of Fisheries lacks adequate staff to operate either of these facilities. There are no laboratory facilities at either station. The Onverwagt Station ponds require additional renovation.

(e) Soesdyke/Linden Highway Research Station at Long Creek and Kairuni

This research unit comprises two field stations of 40 hectares each, one at Long Creek for white sandy soil, the other at Kairuni for brown sandy soil. Research on these locations is directed at crops which are adaptable to these inherently infertile soils. Emphasis here is placed on fruit crops (orange, avocado, carambola, pineapple, grapefruit) and vegetables (wingbeans, cassava, cowpeas, and pigeon peas).

(f) Waini Apiaries Station

This station was established in the Northwest District to determine the potential of the forest flora of the area, as a source of honey. There is currently no formal research conducted at this station. However, there is a demand for honey in the country and major problems with Africanized bees. There is a need to reinitiate research at this station.

(g) The Sugar Experiment Station

The station is located at the LBI Sugar Estates a few miles Southeast of Georgetown. It conducts the research for all of the estates. The station is divided into two sections--Plant Breeding and Plant Production. The station appears to be quite active. Recent research has centered on the problem of cane smut with researchers trying to produce varieties resistant to the disease. There is also a central research laboratory at the company's headquarters in Georgetown.

(h) The Mahaicony-Abary Rice Development Scheme (MARDS)

The station is located at a research facility near the Abary River. The research program started with USAID funding in the early 1970's. The station has about 260 hectares of land used for trials, and a set of laboratories and other buildings. The physical facilities need improvement. The buildings are poorly maintained. Research laboratory equipment needs updating. Other than varietal trials and a limited amount of seed production, there is little research activity. Much more agronomic research is required by GRB.

5. Selection of Research Projects

At the present time, each research institution operates independently of the others. There exists no overall administrative or planning unit which sets priorities for research or coordinates efforts between Ministries and State Corporations. As a general rule, projects are selected in response to immediate production problems. If a disease appears, research is initiated to find a solution. If yields drop, re-

search is started to find a solution. While this is the general rule, some of the research units also have set procedures for project selection.

Within MCL, there is a degree of coordination. Each division is required to submit annual plans. These plans typically contain proposed research projects for the year.

Annually, each member of the Division of Crop Science research staff proposes projects he wishes to conduct in keeping with the overall needs of the country. A joint meeting is held at which each on-going project is evaluated and decisions are made concerning continuity. At the same time, new projects are reviewed based on available funds and on research needs. A research plan is then made up by the Principal Agricultural Officer and his research staff which is sent to MCL for review and final approval. It is the judgment of the Baseline Study team that this Division currently lacks a system for prioritizing research needs. Currently, projects are selected in terms of immediate production problems and not in terms of any strategy for the overall development of agriculture in Guyana.

In the past, in the Division of Soil Science, Technical Committees chaired by the Technical Advisor reviewed projects by research areas. Recently, a review committee has been set up to establish research priorities and rank projects to assure that funding for priority research is available in the event of inadequate financial resources. A multidisciplinary committee has replaced the technical committees to insure that research projects meet the overall interests of MOA.

Plans for fisheries research are initiated by the Station Directors and the Inland Fisheries Director at the end of each year. Annual reports evaluate the year and these evaluations are used to draw up plans for the coming year. These plans are discussed with the Chief Fisheries Officer and the program plans to be implemented during the next fiscal year are formulated. The small research staff allows for ready interchange and easy accessibility to superiors. Hence, the time necessary for planning and start-up of projects is short. Generally, the annual reports are completed in December and new programs begin in February.

GUYSUCO permits the individual researchers to select appropriate research projects. The only requirement is that the project lends itself to increased production, the main objective of GUYSUCO. Final project approval rests with the governing board. Monthly meetings are held with researchers to discuss research accomplishments, problems and future directions. Once problem areas have been identified, researchers are encouraged to address these problems and bring about as rapid a solution as possible to expand sugar production.

GRB has a Divison of Research and Extension which establishes its research program. Much of the research is long range and was initiated with funds from international donors. Typically, the contracts with the international donors specified the type of research to be conducted.

This is certainly true of the varietal research sponsored by USAID in the 1970's and the new research effort at Black Bush Polder sponsored by the same agency.

6. Documentation of Research Findings

There are only limited opportunities for the publication of research results in Guyana. There is currently no publisher of book length manuscripts, and probably not a sufficient market to justify one. There is a journal, The Agricultural Research Journal, which is published occasionally by MOA. The articles are mixed in terms of their quality. The Baseline Study team judged many of the articles to be of scientific merit. Others were less scientific and were of little use to agricultural research.

Another avenue for the publication of research results has been the extension bulletins which are published by the Division of Extension and Education, MOA. However, these bulletins by their very nature are not an ideal medium for research results. They are meant to provide simplified information to farmers, and cannot be used effectively by other scientists.

Unfortunately, much of the research in Guyana goes unpublished. This is due in part to lack of scientific journals and other outlets. However, it goes beyond that. Part of the problem stems from the high personnel turnover in the various units and the resulting lack of continuity. Many units reported that important research had been done in the past and that the person doing the research left, either taking the data with him or leaving the research in a file cabinet unused.

Because of the rapid turnover in research personnel, greater emphasis is being placed on documentation of research data in the Division of Crop Science. In fact, no new appropriation for research will be made unless the researcher has provided adequate documentation of past research. At present, research projects are documented in Divisional annual reports and the Agriculture Research Journal. The former is mandatory, while researchers are encouraged to publish in the latter.

A bibliography compiled by C.D. Knee entitled, "Agricultural Research in Guyana 1920-77" contained over 200 titles of papers on all phases of soil science, including soil chemistry and physics, soil fertility and fertilizers, soil classification and genesis, soil surveying and mapping, soil erosion and reclamation, soil resources and management, many of them published by the MOA. In the last ten years, there has been a decline in the number of technical publications in soil science, although considerable research work has been conducted. One of the present objectives of the division is to publish this backlog of reports.

At GUYSUCO, research findings are documented mainly through end-of-year progress reports. The reports must be approved prior to recurrent funding. In addition, researchers are strongly encouraged to publish their research data in appropriate international journals. However, there is little reward for such publications and as a result, very little outside publishing is done. However, there have been recent publications in international journals.

At GRB, there is little incentive to publish because of the requirements to have the reports approved at several levels. Researchers are often frustrated by the long and tedious process, therefore most research findings remain unpublished.

What is needed is a systematic attempt to establish a national data bank for agricultural research. A move in this direction has been made at the UG library where a document center for agriculture has been set up. Personnel have attempted to assemble a complete set of all publications and other documents dealing with Guyanese agriculture. When a publication is identified but unavailable, the location of the document was noted. Another important set of documents can be found at the USAID Memory Bank for Guyana at the Mission in Georgetown.

However, more than this is needed. Copies of the raw data and descriptions of each project are needed. Ideally, MOA, UG, or NRC could establish a computerized data bank. The various research units could then contribute data and other information to it. USAID is currently funding a project which involves the establishment of a major computer installation in MOA. Once this computer is in place and operating, it should be used by the various research organization to store data bases. Furthermore, it could be used by researchers for data analysis.

7. Resource Allocation for Research

a. Personnel

The various research units in Guyana are experiencing a shortage of personnel. This, of course, adversely affects the units' ability to conduct quality research. Furthermore, all of the units have a number of vacant positions. There is also a high attrition rate for the various units. This is especially true within MOA where routinely there has been a change in key personnel.

Data for the Division of Crop Science is presented in Tables 4.2.2 and 4.2.3. Additional staff is not needed at the present time or in the foreseeable future. There were approximately 77 positions allocated for the Division for the current fiscal year. The PAO is acting and also serves as the Senior Microbiologist. He has an MS degree. The two production managers also have Masters degrees. There are vacant positions for a Senior Microbiologist, a microbiologist, three crop agronomists, two entomologists, and a plant breeder. There are eight Agricultural Officers positions, three of which are filled with BS level personnel.

Table 4.2.2

SUMMARY OF RESEARCH POSITIONS ALLOCATED, FILLED AND VACANT FOR THE DIVISION OF CROP SCIENCES, 1981

Position	Number Allocated	Number Filled	Number Vacant	% Vacant
Principal Agricultural Officer	1	1	-	-
Production Manager--Crop	1	1	-	-
Production Manager--Plant Protection	1	1	-	-
Senior Microbiologist*	1	-	1	100
Microbiologist	1	-	1	100
Crop Agronomist	4	1	3	75
Entomologist	2	-	2	100
Plant Breeder	1	-	1	100
Agricultural Officer	8	3	5	63
Agricultural Technical Assistant	57	24	33	58
T O T A L	77	31	46	60

Source: MOA, Crop Division of Crop Science, and Estimates.

*The present PAO is a microbiologist who acts in this position.

Table 4.2.3

EDUCATIONAL LEVEL OF CURRENT STAFF -- DIVISION OF CROP SCIENCE

Position	Educational Level MS	BS	Diploma/Certificate
Principal Agricultural Officer	1		
Production Manager----Crop	1		
Production Manager---Plant Protection	1		
Agricultural Officer		3	
Agricultural Technical Assistant			24
T O T A L	3	3	24

Source. MOA, Division of Crop Science

There were 53 positions for Agricultural Technical Assistants allocated. Of this number, over half (33) were vacant. Overall, the Division is operating with only 40 percent of its allocated personnel.

It should be noted that there is little depth in the staffing; i.e there is only one staff member trained in each of the key subject matter specialities. This is one of the reasons for a lack of continuity. When a given scientist leaves the Division, there is no one left to continue the research.

In terms of future needs for the Division, there is an immediate need for three agronomists, one plant breeder, one microbiologist, and two entomologists with a minimum training of a BS. There is also a need for additional technicians at the Diploma level. However, before the Division can establish a viable research program, it needs to at least double its professional staff.

A similar situation exists in the Division of Soil Science. The Division is relatively new and there is currently 33 allocated positions with 28 filled. (See Tables 4.2.4 and 4.2.5.) Currently in the Division, the PAO, who has a Ph.D degree, is not a regular Public Service employee. Rather, he has a personal service contract with the Ministry. There is one Master's level person. The rest are Diploma or Certificate-level persons. There is an urgent need to fill existing vacancies for a soil physicist and soil surveyor and three soil chemists. There is also a need for an agricultural engineer and a soil conservation specialist.

The personnel for the Division of Veterinary and Livestock Science, the Ministry of Fisheries and the Ministry of Forestry are discussed in the Extension section of this chapter. Most have extension functions as well as research responsibilities. Suffice it to say that these units also lack sufficiently trained personnel. Because of a lack of trained personnel, there is little or no research going on in these units at the present time.

The situation at GUYSUCO is somewhat better. At present, degrees held by personnel are one Ph.D, one MS and seventeen BS. In addition, other staff have GSA-Diplomas or Certificates. Almost all technical level positions are filled, except for a plant breeder (one is presently being trained), an entomologist, and a plant pathologist.

Research personnel of GRB are concentrated at the MARDS and Black Bush Polder Stations. MARDS personnel include four persons with MS degrees, one with a BS degree, two with GSA Diplomas, one with a GSA certificate, and ten research aides with on-the-job training. GRB research personnel at the Black Bush Polder Station include two agronomists with BS degrees, one agricultural engineer and one agronomist with a GSA Diploma.

Table 4.2.4

SUMMARY OF RESEARCH POSITIONS ALLOCATED, FILLED AND VACANT FOR THE DIVISION OF SOIL SCIENCES, 1981

Position	Number Allocated	Number Filled	Number Vacant	% Vacant
Principal Agricultural Officer	1	1	-	-
Soil Physicist	1	-	1	100
Soil Surveyor	1	-	1	100
Agricultural Chemist	3	-	3	100
Agricultural Officer	2	2	-	-
Agricultural Technical Assistant	25	25	-	-
T O T A L	33	28	5	15

Source: MOA, Division of Soil Science

Table 4.2.5

EDUCATIONAL LEVEL OF CURRENT DIVISION OF SOIL SCIENCE STAFF, 1981

Position	Educational Level			
	Ph.d	MS	BS	Diploma/Cert.
Principal Agricultural Officer	1			
Agricultural Officer		1		1
Agricultural Technical Assistant				25
TOTAL	1	1	—	26

The Kingston Plant has four research personnel with MS degrees in food technology and microbiology, as well as three laboratory technicians. Personnel are well trained in scientific theory, but lack practical experience. Training in quality control and fish handling is presently available at the Guyana Management Development Center. Additional areas of training needs--for the present staff--are fish handling, processing and laboratory work.

EMA-ADA is in the process of hiring a professional staff. Its research program plans to include an Agricultural Officer with a MS degree in soil science and land use, and four Agricultural Officers with MS degrees in economics, engineering, agronomy, and livestock forage. Other personnel at the Diploma/Certificate level who spend at least a portion of their time in research include four Technical Assistants who are assigned to Data Analysis and Economics, two Assistants in Engineering, fifteen field staff in livestock and forage, and eight field staff in soils and land use.

A final point should be made about research personnel. The current research personnel is not even sufficient to properly man existing research facilities. Given Government's commitment to the agricultural development of the hinterlands and the subsequent need for agricultural research, each of the research units must expand their professional staff if they are to effectively address these needs.

b. Financial Resources

Two major generalizations can be made about the level of funding for research. The first is that it is not adequate to address the needs for agricultural research in Guyana. The second is that it is probably at a level which approaches the limits which can effectively be utilized at the present time given the level of personnel in each of the units and the constraints against travel in the hinterland. This is to say, that until the problem of a lack of personnel and logistical problems are solved, it may not make much sense to fund the research units at levels much higher than they are at the present.

Research in the Division of Crop Science is funded with recurrent and capital allocations. Recurrent allocations is a continuous funding mechanism for on-going research projects which will require two to three years for completion. At the end of each year, progress reports must be written and approved prior to new appropriations. Capital allocations are funds identified above those already appropriated for research projects. Because the capital funding is short term, the projects funded through this means are of short specified duration, usually not more than one year. It was the team's judgment that the allocation of funds in the Division tend to be in terms of particular activities rather than the overall system. For example, the Division has recently expanded the level of funding for seed technology without increasing proportionately the funding for plant protection. The seed program has not resulted in increased production because plant protection has not received adequate attention.

Generally, there is no problem in getting projects approved and funded as long as they address the immediate needs of the country and do not require large capital outlays. In fact, most researchers probably have too many projects to be able to handle them properly. This is especially true, if the projects are in the interiors, where transportation is difficult and time-consuming. It is difficult to estimate the research budget for this Division because it is not separated from the other activities--seed purchasing, plant production, etc. The total budget for the Division in 1979 was about G$ 600,000. It would probably be reasonable to estimate the research portion was about G$ 200,000.

Research project needs and priorities of the Division of Soil Science are established by a project review committee and allocation of funds to each project is made by the Principal Agricultural Officer. The operating budget was G$ 90,000 in 1979, G$ 129,000 in 1980, and G$ 175,000 in 1981, which is considered to be adequate. However, chemicals, fuel, machinery, laboratory, and greenhouse equipment are extremely difficult to obtain, because of foreign exchange problems. Salaries, although not budgeted within the operating budget, are inadequate, and there is no provision for increases.

There is no separate budget for research in the Division of Veterinary and Livestock Sciences. Applied problem-solving and documentation of natural events are among the overall responsibilities of the Division, but formal research activities do not exist.

The Ministry of Fisheries has seen an increase in research funding. In 1979, G$ 22,747 was spent on operating costs with G$ 46,358 spent on capital expenditures. In 1980, funding was more than doubled to G$ 44,944 for operating costs and G$ 130,935 for capital expenses. The scope of research work is dependent on the level of funding. Therefore, if funding is inadequate, costly projects cannot be undertaken and are not proposed. For example, funds are not available to install drainpipes that have already been purchased or to buy reagents necessary for laboratory analysis.

There is no budget provided for the Nursery in the Ministry of Forestry. Lack of funds constitutes the single largest constraint to research development. A demonstration pine plantation of 1000 acres was planted, but had to be abandoned for lack of funds to maintain the project.

Research projects at GUYSUCO are funded through recurrent allocations, usually for a three-year period, with yearly project evaluation and updating. The funds are generated through sugar sales, and data were not available for actual yearly appropriations to support GUYSUCO's research efforts.

GRB does not separate its budget into research and extension allocations, therefore, the combined figure is as shown in Table 4.2.6. Probably half of the budget can be assumed to go into research. Based on discussions with GRB personnel, it is felt that more capital funding is

Table 4.2.6

BUDGET FOR GUYANA RICE BOARD, 1976-1980

Year	Capital - G$	Recurrent - G$
1976	84,000	710,686
1977		720,127
1978	19,000	799,202
1979	10,000	1,126,619
1980	69,848	1,554,976

needed for improvement of laboratory facilities and equipment. Although appropriations are increasing, they have not permitted research efforts to keep pace with the needs of the rice industry.

In summary, the total amount allocated to agricultural research in Guyana is relatively small and certainly not of the magnitude to support the type of research program necessary to deal with the many problems associated with the country's effort to increase agricultural production. However, until the research units are adequately staffed with trained personnel, it makes little sense to greatly increase the level of funding. The current units are already over-extended. Additional research projects would need additional personnel.

8. Research Facilities, Equipment and Supplies

Most of the research facilities for the MOA are located at the Central Agricultural Station (CAS) at Mon Repos. There are seven other research stations under the direction of MOA that support crops and livestock research (see Table 4.2.1). In general, facilities for research at CAS and the sub-stations are adequate for sound productive research. Equipment is adequate, when all of it is operative, which is not always the case, as there is a repair problem due to lack of spare parts.

The team visited the CAS facilities at Mon Repos. The microbiology laboratory at Mon Repos is adequate for basic microbiological research; it is spacious and well kept. A general survey of laboratory equipment indicated the following--1 orbital incubator shaker, 1 spectrophotometer, 2 oven sterilizers, 2 incubators, 1 water bath, 1 Mettler balance, 1 laminar flow cabinet, 1 phase contrast microscope, 1 UV-light, 2 centrifuges (1 small, 1 large), 1 steam generator, 1 fermentor (stainless steel), and 1 refrigerator.

The plant pathology laboratory is also in adequate condition. The following equipment is available--2 microscopes, 1 drum-type autoclave (non-functional), sieves for nematode separation, 1 bacterial colony counter, 1 UV-light isolation cabinet, 1 refrigerator, 1 pressure cooker for sterilizing media, 2 incubators, 1 pH meter, and 1 blender for nematode separation.

The entomology laboratory does not have major equipment. The insect museum of Guyana is currently being upgraded.

CAS has 750 acres of land available at Mon Repos for field experimentations to which the research units have access for field studies. The land is level, artificially well-drained and fenced.

The Crop Science and Soil Science Divisions occupy most of the main building at CAS. The building is adequate in terms of research and office space but there is little room for expansion and rearrangement of laboratories. Equipment is in excellent working condition.

The Soil and Plant Testing Laboratory is set up for analysis in batches of 33, including three controls. With some adjustment in working hours for technicians, the laboratory has the capacity of analyzing 396 samples per day. A description of facilities available at the CAC for the Division of Soil Science is found in Table 4.2.7.

The Veterinary Diagnostic Laboratory is being funded through CIDA and UNDP assistance. When completed, it will increase facilities for the pathological, microbiological and clinical chemistries laboratories. The planned laboratory appears quite adequate for the Division.

The Onverwagt Station is located on 115 acres of land with twenty-three ponds as follows: one pond of 12 acres, one pond of 7 acres, six ponds of 4 acres, two ponds of 1.5 acres, six ponds of 1 acre, four ponds of 0.25 acre, and three ponds of 0.10 acre. The remaining 62 acres are utilized for pasture, paddi and coconuts.

There is one building at the Onverwagt Station which presently serves as residence for Korean technicians. One lower room is utilized as a storage room for cast nets, tools and two desks. The four concrete holding tanks outside the building are in reasonably good repair. Laboratory space is available, but there is no equipment for reagents.

The Botanic Gardens Station is located on 2 acres of fenced and level land with a total of 16 ponds which have been reasonably well maintained. New ponds, constructed in 1980, have no drainage. Drainpipes have been purchased, but not yet installed. At present, these ponds are drained by pumping water into a drainage canal running the length of the Station. Older ponds have monks for drainage. There is one building at the Station which is used as a hatchery and which also has office space with two desks. Four shallow hatching trays and four concrete spawning tanks are used to induce spawning of hassar. After spawning, eggs are removed from the nest and incubated in glass jars with respirators supplying oxygen. Fry are stocked into nursery ponds from the hatching jars. The hatchery building has recently been repaired and painted. The concrete tanks are quite functional, but the hatching troughs are in need of repair to correct variable water pressure constraints. Electricity blackouts introduce great risks in hatching hassar eggs with electric respirators, if there is no back-up electrical system.

Buildings, equipment and additional needed equipment are listed in Table 4.2.8. The information is for both Onverwagt Station and Botanic Gardens.

The Forestry Nursery is composed of 500 acres. There is one residential building located on the nursery. The faculties are currently receiving little usage because of lack of funds and personnel.

Table 4.2.7

INVENTORY OF RESEARCH AND OTHER EQUIPMENT

No.	Item	Description	Current Use	Rating	Needs and other comments
1	Perkin-Elmer Atomic Absorption Spectrophotometer 305	double beam	Research & Routine Analysis (RARA)	1	
2	Perkin-Elmer Atomic Absorption Spectrophotometer 103	single beam	RARA	1	Needs circuit boards for damaged electrical systems
1	Perkin-Elmer Spectrophotometer 55		RARA	1	
1	Fischer Spectrophotometer 205		RARA		
1	Acumet pH meter		RARA	1	
1	Solubridge		RARA	1	
3	Semi micro		RARA	1	
1	Crude fiber digestor		RARA	1	
1	Water distillation unit	1000 l capacity	RARA	1	
2	Fume hoods		RARA	1	
3	(Batch) drying ovens	large, wooden	RARA	1	
1	Soil Moisture-Pressure Plate	ceramic plates, maximum 15 bar	Soil Moisture charact. curve	2	

Table 4.2.7--continued

No.	Facility	Description	Rating
2	Laboratories	a) routine soil & plant analysis	1
		b) soil characterization & physical measurement	1
3	Offices	a) Technical Advisor	1
		b) Agricultural Officers	1
		c) Field Staff	1
	Land	Level, poorly drained soils with good artificial drainage 750 acres	1
	Mechanical systems (electricity, plumbing)	In general the facilities are in excellent condition. Innovations in design and plumbing have established an efficient system for direct delivery of distilled water to the batch systems employed in the Soil & Plant Analysis Laboratory.	1

Table 4.2.8

RATING OF BUILDINGS AND EQUIPMENT AT ONVERWAGT STATIONS AND BOTANIC GARDENS

No.	Facility	Description	Rating	Needs
	Onverwagt Station			
1	building	two-storey	3	reorganization
1	office	basement	5	office equipment
4	holding tanks	concrete	3	
23	ponds	varying sizes	3	maintenance
	electricity		3	
	water supply	tidal	3	
	Botanic Gardens			
1	building	hatchery	1	
1	office		3	office equipment
	holding tanks	concrete	3	
22	ponds		3	drains, weed control
	water source		3	
	water supply	hatchery	3	reliability
	electricity		3	back-up system

Table 4.2.8--continued

Equipment

No.	Item	Description	Use	Rating	Needs
	Onverwagt Station				
1	Hatch kit	small	water analysis	5	new, large kit
1	Scale	hanging	weigh fish	3	bulky, not portable
3	dipnets		transfer fish	3	
3	castnets		sampling	3	
3	liftnets		harvest	3	
	Botanic Gardens				
4	Hatch kits	small	water analysis	5	new, large kits
1		5m 1/2 mesh	harvest	1	
2	castnets		sampling	1	
1	measuring board		data collection	1	
1	oxygen bottle	without gauge	fingerling shipment	5	new bottle & gauge
1	brushcutter	gasoline powered	dike maintenance	3	
1	water pump		drain ponds	1	back-up pump

GUYSUCO's facilities and equipment for research are adequate for research presently underway. However, the greenhouse is in need of repair. Spare parts for broken equipment and research supplies are extremely difficult to obtain. The problem lies with import restrictions rather than with a lack of funds. This poses the most limiting constraint on research at GUYSUCO.

There is a soils laboratory at MARDS equipped to do a limited amount of qualitative soil testing. Most of the soil testing, however, is done at the MOA-CAS, Mon Repos, Soil Testing Laboratory.

The Kingston Plant has a laboratory and test kitchen. Both are fully equipped, and at the present time, there is no need for additional equipment.

9. Salaries, Promotional Structure and Professional Development

The general consensus of everyone questioned during this study was that salaries for agricultural professionals are very low and that there is, consequently, a high level of dissatisfaction among employees. Research professionals in Guyana compare their own economic situations with both their colleagues in the country and with those in other countries. While salaries are generally low in Guyana, there is some differential between the Public Service salaries paid by MOA and those in the State Corporations. Those in the State Corporations tend to be higher.

When the salaries of Guyanese professionals are compared to their counterparts in neighboring Caribbean countries or elsewhere in the world, they are found to be substantially lower. Most agricultural researchers with a BS, MS, or Ph.D degree did much of their academic work outside of Guyana, often in the United States. They see their ex-classmates making a great deal more money in positions which often require less professional expertise and less responsibility. In recent years, an increasing number of well-trained Guyanese scientists have left the country to take better paying jobs elsewhere.

A related problem is that Government has faced great difficulty in getting many Guyanese who are studying at foreign universities to return to Guyana after the completion of their studies. Many want to remain abroad where the pay is better and career opportunities are greater.

Table 4.2.9 contains salary information for personnel in the Division of Crop Science. The PAO receives a salary of G$ 12,384. Production Managers, Senior Microbiologists, Agronomists, and Plant Breeders also make over G$ 10,000 per year. The other salaries range from G$ 9,648 for the Plant Pathologist down to an average of G$ 4,495 for Agricultural Technical Assistants. In addition, there is a duty-free allowance of G$ 125 - 150 per month, depending on the position. The salary structure is designed to allow an individual to get three yearly incremental raises. Any additional raises must be through promotions, as

Table 4.2.9

SALARY SCHEDULE FOR DIVISION OF CROP SCIENCE PERSONNEL, 1981

Position	Position Rating	Mean Salary G$
Principal Agricultural Officer	A33	12,384
Production Manager	A31	11,640
Senior Microbiologist	A27	10,537
Microbiologist	A24	6,821
Crop Agronomist	A27	10,080
Entomologist	A27	7,592
Plant Pathologist	A27	9,648
Plant Breeder	A27	10,537
Agricultural Officer	A24/A21	7,959
Agricultural Technical Assistant	A17/A15/A13	4,495

Source: Estimates: Current and Capital of Guyana for the Year 1980 As Presented to the National Assembly

outlined earlier. Because the number of positions is fixed, the only way a person can be promoted to a higher position is for a position above him to become vacant. There have been few promotions and no raises within the past five years. This has caused much dissatisfaction and discontent among researchers and many have sought employment elsewhere.

Table 4.2.10 contains salary information for the Division of Soil Science. As would be expected, the salaries are comparable to those of the Division of Crop Sciences. There is dissatisfaction with the salary schedule which has drastically affected recruitment and retention of staff. Promotion has been based on seniority in the past. The problem with this system is that it rewards seniority and not efficiency of work. There has been great improvement in job interest, efficiency of work and interest in pursuing development since 1979, due to the reorganization and upgrading of the lab, "in-house training," and interest shown in the staff by the Technical Director. Staff are encouraged to continue their formal education. Additional "in-house training" in soil science, soil survey techniques, solution chemistry and reviews of literature is provided to increase staff education and background. An Agricultural Officer was sent to the United States to do a special course in soil testing, but did not return to Guyana. The Technical Advisor attended a workshop on "Priorities for Alleviating Soil-Related Constraints to Food Production in the Tropics," as a result of an invitation from Cornell University. The workshop was held at IRRI, Las Banos, Philippines, June 4-8, 1979.

Salaries for the Division of Veterinary and Livestock Science, the Ministry of Fisheries, and the Ministry of Forestry are similar to those above. Detailed tables for each of these units are presented in the Extension section of this chapter.

Promotion in MOA is given for both education and experience. Certain levels within the MOA require academic degrees. For other positions, a specified number of years experience is considered equivalent to holding a degree. For example, a degree plus five years of experience is regarded equivalent to an MS degree. There is a certain amount of dissatisfaction with this system, as its structure is such that formal training is favoured over experience. One can achieve promotions much quicker by acquiring degrees than through experience. A more balanced approach giving greater emphasis to experience and developing a weighted approach in lieu of strict mathematical equivalencies is suggested. Also suggested was that accomplishment or evaluation of overall competence should be the final determinant for promotion.

Salary figures for the State Corporations were not available. However, there is general agreement that they are substantially higher than MOA. When questioned about the salary differential, most people indicated that the State Corporations pay salaries that are 10 to 15 percent higher than the Public Service salaries. However, it should be noted that even the State Corporation salaries are substantially lower than those paid in neighboring countries.

Table 4.2.10

SALARY SCHEDULE FOR DIVISION OF SOIL SCIENCE PERSONNEL, 1981

Position	Position Rating	Salary G$
Principal Agricultural Officer	A33	12,384
Soil Physicist	A27	9,648
Soil Surveyor	A27	9,648
Agricultural Chemist	A27	9,944

Source: Estimates: Current and Capital of Guyana for the Year 1980 As Presented to the National Assembly

The salary differential results in a great deal of attrition both in the MOA and the State Corporations. The differentials within Guyana tend to result in scientists leaving MOA to work for a State Corporation. The differential between Guyana and foreign opportunities often result in the loss of talented personnel from the system altogether.

The salary problem is one that must be faced if Guyana is to establish and maintain a viable research program in agriculture. Unless it is, it will be difficult to maintain the necessary numbers of trained personnel to run the program. MOA professional personnel should be paid at the same level as colleagues in the State Corporations. A solution would be for the MOA research organizations to be removed from the Public Service domain. A corporate body could be established which would have as its function the production of agricultural research. MOA could contract with the research corporation to have specific research done. This would remove research employees from the Public Service jurisdiction and allow professional researchers to be paid the same salaries as those in State Corporations.

10. Research Clientele

The research clientele varies for each of the research units. The Division of Crop Sciences primarily services private farmers. However, it also provides information to various State Corporations. In recent years, it has responded to requests from GRB, GUYSUCO, GNS, and CARICOM. Once again, its research centers on crops other than rice and sugar.

The original clientele of the Division of Soil Sciences in 1878 was sugar estates. At the present time, soil science research serves farmers, production parastatals, MOA-Extension, and other institutions. The Division regularly performs soil sample analyses for both private producers and the State Corporations.

GUYSUCO was the primary client for research conducted at the Onverwagt Station of the Ministry of Fisheries in 1980. After establishment of the GUYSUCO-Blairmont Estate project, the station will return to research oriented towards developing a viable commercial production system in brackishwater ponds.

The general clientele of GRB research is the rice industry and other grain industries that might incidentally benefit from findings. Most rice farmers have farms of only about 10 acres. The research done at MARDS, Black Bush Polder and other sites is designated to address the needs of small producers.

Sugar research efforts undertaken by GUYSUCO primarily serve the corporation itself. GUYSUCO's primary objective is production and the research program is oriented towards increasing and diversifying production. Individual farmers benefit indirectly from spinoffs of production breakthroughs; information is available to them on request. Also, cane

farmers are required to adopt a uniform technical package developed by the research program.

11. Research Linkages

An assessment was made of the linkages which exist between research units in MOA and other organizations, both domestic and foreign. Linkages were characterized as being formal or informal, and in terms of the strength of the relationship (see Table 4.2.11).

Linkages between research units varied. Those between units in MOA were judged to be formal and strong. Researchers in various Divisions cooperated in research efforts. The Ministry's administrative structure facilitated this. On the other hand, the linkages between MOA units and others (GRB, GUYSUCO, etc) were essentially informal and weak to moderate in nature. Typically, there is little cooperation or sharing of facilities, personnel, etc. Rather, each unit tends to operate independently. However, it is not unusual for one unit to request specific types of assistance from another unit. For example, GRB might request soil analysis from the Division of Soil Sciences. What is needed is an overall advisory committee to coordinate efforts between units and to keep everyone informed.

The linkage with GSA can be characterized as formal but moderate. It is formal for several reasons. First, key people from the MOA and several State Corporations involved in research are on the Board for the school. Furthermore, these units provide both personnel (part-time teachers) and technical advice to the school. Finally, some personnel from GSA are involved in research efforts. However, the strength of the relationship was judged to be moderate.

The linkages with the other educational institutions were judged to be informal and weak. This seems especially unfortunate with regard to UG-FA. One would hope that there would be a great deal of interaction between university personnel and the various research groups. There is not at the present time.

The linkage with extension units was judged to be formal but weak. Research and extension programs are housed in the same locations. There is a lot of contact, both formal and informal, between personnel of the two groups. However, there has been a problem in terms of extension personnel being able to utilize research results in their program. There has been a poor job done in terms of developing extension materials from research results. The reverse of this is that the extension units appear to have little input into the research efforts.

There are important linkages with foreign universities, international research organizations and professional groups. A number of researchers have links with UWI or American universities. They exchange information and interviews and cooperate on specific projects. This is also true of professional organizations. GUYSUCO actively participates

Table 4.2.11

RESEARCH LINKAGES BETWEEN MOA AND OTHER AGENCIES

Agency	Formal	Informal	Strong	Mod.	Weak
Among Research Stations	x	x	x	x	
University of Guyana		x			x
Burham Agricultural Institute		x			x
Guyana School of Agriculture	x	x		x	x
Home Economics Training School		x			x
Other Guyanese Educational Inst.		x			x
National Science Research Council		x			x
MOA - Extension	x	x			x
Guyana Sugar Corporation GUYSUCO		x			x
Guyana Rice Board GRB		x		x	x
Guyana Pharmaceutical Corp. GPC		x			x
Guyana Marketing Corp. GMC		x			x
Guyana Fisheries Ltd. GFL		x			x
Livestock Development Corp.		x		x	x
Local Farmer Groups		x			x
University of West Indies UWI	x			x	
Other Foreign Universities	x		x	x	
Int'l Research Institutions	x	x		x	
Int'l Prof. Organizations (n.t.)	x		x	x	
Int'l Prof. Organizations-trop.	x			x	x
Guyana Wildlife Association		x			x
Ministry of Health - Livestock		x			x

in its international sugar research organization. GRB communicates regularly with IRI and MOA is active in CIAT and other groups. Finally, many of the researchers in the various research units are active in their own professional organizations, both in the Caribbean and outside the area.

12. Major Problems and Weaknesses of the Research Program and Suggestions for Improvement

The major problem found among all research programs is that they are designed and carried out on a discipline basis rather than on a commodity basis. This creates a situation in which optimum utilization of time, effort and resources is not realized and results in a duplication of efforts. Future research efforts should be built on a program-project concept, in which a broad program is outlined for a particular commodity. This would permit projects from all research areas to be coordinated around a specific production goal. An example of this approach may be a project to increase cotton production for the textile industry. Such an effort could involve plant breeders, soil scientists, plant pathologists, entomologists, crop physiologists, economists, sociologists, and production specialists. This multidisciplinary team would initially come together and decide what is needed to address the problem. Once this is done, each member would be responsible for developing a project or projects under the program to assist in accomplishing the overall objective. Periodic meetings would be held to discuss progress and to keep each team member informed of the present status and the future direction of the program. With this approach, maximum utilization of all inputs can be realized; and it would serve as a means of disseminating research findings to a broader spectrum of people at a faster rate.

The second major problem observed is a shortage of technically trained personnel. Many of the mid and upper level positions are vacant, or, in some cases one person is filling two or more positions. This was found among all agencies, but most often in MOA. The reason repeatedly cited is that of inadequate salaries, especially in MOA. Under the present organizational structure, state corporations are governed independently of MOA and as such can set their own salary scales. Because they are designed mainly for production, and as such generate considerable revenue, they can afford to pay higher salaries than MOA. This system works against MOA and if it continues unchecked, it will result in an increasingly serious problem.

Another reason for the shortage of trained technical staff is the failure of students sent abroad for educational training to return home upon completion of their education. Most of these students were sponsored by MOA which accounts for its high vacancy rate. It is felt that these students do not return home for two main reasons: salary levels in the foreign countries where the students study; and a lack of communication between the students, the government, and school officials in the foreign country where they study. Students are allowed to choose their own course of study, and often it does not coincide with the needs

of the country. Strong direct communication between the MOA and appropriate university officials could eliminate many of these problems. In addition, wherever possible, MS students should be encouraged to do their research problem or thesis research in Guyana or on a problem important to the country. This would require support from the GOG; however, it would produce results beneficial to agricultural producers.

A third problem is that of inadequate supplies and equipment to effectively carry out research program objectives. In visiting the various research stations and laboratories, one cannot but notice the pieces of equipment that are not operational due to lack of spare parts and/or supplies needed to operate them. Many researchers stated that supply requests are often 6-8 months behind schedule, and in a few cases, have taken longer than a year to be filled. This has resulted in the complete failure of several projects and has caused incomplete results on others. Multiple year project planning and cooperation between scientists and laboratories might resolve this problem in time and insure the successful completion of projects. As discussed earlier, the problem of supply shortage is more one of lack of foreign exchange than lack of sufficient funds. In light of this, some priorities must be set on foreign exchange for supply purposes, if this problem is to be resolved.

The final problem observed is the excessively heavy administrative load put on many of this highly trained technical personnel. This is especially true of newly trained personnel who, in most cases, do not have experience with their own discipline, and who have no administrative training. With the shortage of trained personnel already existing in many of the research areas, the country can ill afford to have such individuals spend most of their time performing administrative duties. A better solution might be to educate people to serve as administrators.

A summary of the major problems found in the research segment of the REE system is as follows:

-- There are insufficient support personnel for most of the research efforts in Guyana. Additional B.Sc. level personnel are needed.

-- There is a salary differential between MOA personnel and the State Corporations. This makes it extremely difficult for MOA to retain personnel. This differential should be eliminated.

-- There is a lack of coordination between the various Divisions in MOA, and between MOA and the State Corporations. A comprehensive adinistrative structure for agricultural research is needed.

-- Most researchers have too many responsibilities. Many of them are not even related to research. Research personnel should be separate from other personnel and assigned only research tasks.

Additional personnel should be hired to perform non-research activities.

-- Research is currently underfunded. Funds from production units operated by MOA should be used for research.

-- Research results are not routinely transferred to the farmer in a timely or appropriate manner. Research personnel need to work more closely with extension personnel in the preparation of extension materials. Research personnel should participate in additional farmer workshops and field days.

-- Researchers rountinely experience transportation problems and often find it impossible to monitor their research projects in the hinterland. Efforts should be made to share transportation resources between the various research and other agricultural organizations.

-- There is too much of a lag in time between the completion of a research project and the publication of the results. Much of the problem is due to the approval procedure for publication which often takes several years. Review committees should be established and procedures established to assure that research findings can be published in a much shorter period of time.

-- There is not enough incentive given researchers to publish research findings outside Guyana. Often the only record of a research project is in the end-of-year progress report, which is not usually circulated. There should be free exchange of research findings throughout Guyana, the Caribbean and the world by means of national and international journals.

The research program in Guyana also has strengths. The major strength is the scientists themselves. They are, by and large, well-trained, competent and hard-working. More of them are needed.

There is much vigor in the research program in Guyana. The need is to build on its strengths and to solve some of the basic problems. A strong, well-staffed research program is necessary if Guyana is to achieve its development goals.

C. Agricultural Extension in Guyana

1. Development of the Current Extension Program in Guyana

Extension activities were first organized in Guyana in 1910. Extension was established by the colonial government to provide technical information to producers concerning various crops and to promote general agricultural production. At that time in Guyana's history, the only important agricultural export crop was sugar. Thus, the extension activities centered on crops for local consumption.

At the time of independence, extension activities, with the exception of work with the cane farmers, was under the Ministry of Agriculture, Division of Extension and Education. The extension agent was a generalist delivering information concerning rice, other crops and livestock, although there was some specialization at the higher levels of the service. His clientele was then, as it is now, farmers with small acreages who engaged in mixed farming.

Since that time, there has been fragmentation of the extension effort in Guyana. In the late 1960's USAID funded the Ranch Management Training Program, which allowed several dozen Guyanese to be sent to Tuskegee Institute to be trained as junior level Livestock Officers. Upon their return, the graduates of the 28-month program served as the nucleus of the extension section of the Division of Veterinary and Livestock Science of the Ministry of Agriculture. Since that time the division has recruited livestock agents from GSA and recently from REPAHA. At present, Livestock Assistants work out of the same offices as crop extension personnel in the Division of Extension and Livestock, and more importantly, often serve the same clientele; i.e. small farmers who engage in both crop and livestock production. It should be noted that one of the reasons for the establishment of a special extension effort for the livestock sector was the desire by Guyana to develop the livestock for the export market. Unfortunately, due to disease and production problems the export market has not developed.

Prior to 1973 the Guyana Rice Corporation was responsible for extension among rice producers. In that year, as a result of the USAID funded Rice Modernization Project, the Guyana Rice Board was created. GRB resulted from a merger of the Guyana Rice Corporation and the Guyana Rice Marketing Board. The GRB created the Division of Extension and Education and since that time it has provided extension services to rice farmers. A separate extension service was developed for rice producers because of the increasing importance of rice to the Guyana economy. As discussed in Chapter II of this report, rice was developed as an export crop during World War I. The Government of an independent Guyana was interested in expanding exports and rice became a key target for this endeavor. While this seemed like a good idea, there was a basic problem. Relatively few farmers grew rice as a monoculture. Rather, they engaged in mixed farming, producing other crops and livestock. Therefore, a significant proportion of the rice farmers needed service from

2. The Current Extension Structure in Guyana

At the present time, several Guyanese organizations provide extension and extension-type services to farmers and other rural people. Each of the Sub-Ministries under the Ministry of Agriculture has a unit or units with extension functions. There are two Divisions in the Ministry of Crops and Livestock, Division of Extension and Education, and Division of Veterinary and Livestock which carry out specific extension activities. Within the Ministries of Fisheries, Forestry and Drainage and Irrigation, explicit extension functions are assigned to various units, even though they are not extension units per se. Within the Ministry of Education there are Youth Clubs organized by the Division of Agricultural Education which are similar to the 4-H Clubs or the Future Farmers of America organization which promote sound agricultural practices. Furthermore, many of the state corporations, such as GUYSUCO, GAIBANK, GRB, MMA-ADA, GPC, LIDCO and GMC, either have formal extension departments or routinely carry out extension functions.

a. Ministry of Crops and Livestock--Division of Extension and Education

The largest and most important extension organization in Guyana is the Division of Extension and Education in the Ministry of Crops and Livestock. It has a national office at Mon Repos headed by the Principal Agricultural Officer-Extension and Education. The PAO, along with a staff of three Senior Agricultural Officers has the responsiblity for formulating and directing the nation's extension program. Below the national office are 10 regional offices, each headed by an Agricultural Officer (AO) who is responsible for formulating the program of the region and supervising staffs of four to six Agricultural Field Assistants (AFA) and a Plant Protection Assistant (PPA). It is the AFA who is responsible for delivering the technical information to the farmer and for providing the services on the local level. Typically, the AFA is assigned responsiblity for a sub-region, composed of a major town or village and the surrounding area.

The Division has responsibility of providing extension services for all crops, except rice and sugar. Its stated functions are as follows:

1) Promotion of increased production and productivity of important agricultural crops;

2) Education of farmers in modern agriculture by utilizing extension techniques;

3) Promotion and development of local production groups among farmers;

4) Procurement and sale of required production inputs to producers;

5) Provision of Plant Protection Services.

Annual plans are developed, both on the national and regional levels. These plans include production targets and a program of work, scheduled field days, demonstrations, and meetings. For example, the 1981 Program of Work of East Berbice Extension District has scheduled extension activities and production targets for coconuts, citrus, plantain, ground provisions, green vegetables, black-eye peas, and corn. Associated with each crop project is a budget and a list of needed agricultural inputs. At the district and farm level, extension personnel are responsible for (1) providing technical advice concerning agricultural practices, credit and marketing, and (2) the distribution or sale of agricultural inputs such as fertilizers, pesticides, seeds, and nursery stock. The AFA has the overall responsibility for serving the farmer. However, in most regional offices there is a Plant Protection Specialist who has the responsiblity for advising farmers on pest control, weed management and plant diseases.

With the reorganization of the Government early this year, the Regions have been given more autonomy. This will certainly have a major impact on the program of the extension service. It is anticipated that the Regional Government will play a more important role in the formulation of program and policy for the extension service in its area. Correspondingly, it is be expected that the Divisional office at Mon Repos will play less of a role. While the principle of decentralization may be a good one for government in general, it could have negative effects on the extension program in Guyana. An early indication obtained by the Baseline Study Team talking with Agricultural Officers at the Regional level is that they feel that much of their direction will come from non-agriculturalists--from politicians. This fear was expressed especially with respect to the allocation of resources in the Regions.

The most common types of extension methodology employed are seminars, field days, demonstrations and farm visits. The first three activities are centered around the particular crops and/or production problem that have been selected by the regional officer for emphasis for the year. For example, one of the major projects adopted by the East Berbice Extension District was vegetable production. The goal was to increase significantly the production of particular vegetables. In order to promote vegetable production, the district office is sponsoring a number of activities such as shallot bulb production, demonstrations regarding particular cultivation problems, a seminar on shallot, field days on onions, and seminars on pest control for vegetables. These activities are being held at various places around the district and utilize various district extension personnel.

With regard to farm visits, these appear to be unsystematic and largely unstructured. The AFA seems to lack a particular program with regard to the farmers in his jurisdiction. He may casually drop in on producers or the producers may seek out his assistance, but there is no

expectation that the extension agent will visit the farmers in his area on a regular basis. Some farmers are visited several times during the year while others are never contacted. Part of the problem is a lack of transportation. The transportation equipment at the district level is often not functioning, and there is also a shortage of funds for transportation. The problem, however, cannot be totally excused in terms of transportation difficulties, for that there is no evidence of a plan for systematic farm visits that would be implemented if transportation were available. As well as establishing production goals and conducting meetings and demonstrations, the regional office should set goals and guidelines for farmer visits. Each AFA should be given targets in terms of the total number of farm visits he or she should make each week or month, and the number of times each farmer should be visited. Having a systematic program to contact farmers and promote the program of the Extension Service is fundamental. The Division should have a set of technical packages for each of the key crops in Guyana and it should actively promote them among the farmers.

Of course, farm visits in and of themselves, are of little value. Unless the extension agent is delivering technical advice that can increase the farmers' production and/or income, the visits are of little consequence. Currently, there is little evidence that the AFA is actually delivering, at least in any systematic way, a useful technical package. Two things are needed. The first is a set of technical packages to cover the various crops being produced, and the second is active promotion of the technical package for the crops given priority by either the regional or national office. The Government has indeed selected a number of key crops in Guyana for emphasis, crops that are needed to either reduce imports or to increase exports. The list is long--milk, crops for edible oil, cotton, grain, etc. It would seem prudent for the Division to develop technical packages for each of these crops and then to promote systematically them among the traditional farmers of Guyana. Unfortunately, the approach has been to charge the various state corporations with the production of these crops. Thus far, the success rate has not been impressive.

Another deficiency noted in terms of farm visits by extension agents is that there is no evidence that the agent helps the farmer to construct a farm plan or advises him on the merits of adopting the various agricultural enterprises that are available to him. Rather, the agent seems to accept as given the combination of enterprises the farmer has selected himself. Nor does the agent keep records on each farm visit or relevant information about the production activities of each farm. This sort of information is essential if the agent is to provide informed advice to the farmers. What is needed is for the agent to keep detailed records on each farm operation in his jurisdiction and to begin to work with farmers helping them to select agricultural enterprises which can maximize farmer income.

One encouraging extension practice is the fostering of farmer groups known as production groups. The Division of Extension and Education over the last few years has promoted the formation of these groups at the local level. These groups provide of contact between the extension service and farmers and have proven useful to the Ministry for promoting particular crops and/or practices. The extension service selects a farmer to serve as leader of the production group, and in the past the leader has been paid a stipend by the Government. Table 4.3.1 shows the distribution of production groups by regions for 1979-80. In 1978, there were 133 production groups in the country. This decreased to 68 in 1979 and rose to 83 in 1980. The reasons for the decrease were reported to be: (1) that the Ministry terminated the payment of stipends to leaders and many lost interest; (2) the AFAs lacked adequate budget and transportation to visit the groups regularly; and (3) the AFA's lacked sufficient knowledge of group dynamics to successfully organize and maintain groups. It should be noted that production groups have been most successful with Amerindian producers who already have a village organization, so that the village chief tends to serve as the leader of the production group. The production group seems to be a particularly good extension mechanism in Guyana and should be promoted more actively. When appropriate, these production groups could become cooperatives. The cooperatives might initially take the form of buying and/or marketing cooperatives. The Division could use the groups to promote the agricultural program of the Government.

With regard to clientele groups, there are no data available from either the national or regional offices as to the number of farmers served or their characteristics in terms of size or crops produced. This Division is charged with the responsibility of providing technical information and inputs for all crops, except rice and sugar, to private farmers. The clientele can be characterized as having small acreages, low incomes and engaging in mixed agriculture. The description of the private producer found in Chapter II (See pages 12 - 19) of this report characterizes the clientele of this Division.

Within the Division of Extension and Education, there is a Communications Section which is responsible for producing extension materials suitable for the farmers. Currently, this section is utilizing three forms of media for this purpose--bulletins and publications, newspaper articles, and radio programs. The Communications Section is headed by an AO and has several AFAs assigned to him, as well as two photographers. This unit services other Divisions within MCL and even other Ministries. For example, there are several bulletins used by the Ministry of Fisheries which were prepared by this unit.

The bulletins for farmers are typically developed in concert with the technical Divisions of Crop Science, Soil Science and Veterinary and Livestock Science. Quite often, they are written by one of the scientists assigned to one of these divisions. They generally provide farmers with a simple-to-follow guide for the production of a particular crop and include pest management, harvesting, and usage. They are written in nonscientific, easy-to-understand language. Several dozen such

Table 4.3.1

AGRICULTURAL PRODUCTION GROUPS BY REGIONS, 1978-1980

Region	1978	1979	1980
Northwest	15	16*	17
Upper Demerara	21	18	8
East Demerara	8	6	-
East Berbice	12	9	9
Berbice River	9	7	8
Rupununi	24	5	-
Essequibo	44	7	10
West Demerara	-	-	29
Berbice	-	-	2
TOTAL	133	68	83

SOURCE: Principal Agricultural Officer, Division of Extension and Education, Ministry of Agriculture

*The figure for the Northwest for 1979 is an estimate and was obtained by averaging the figures from 1978 and 1980.

bulletins have been produced and are being distributed by extension agents. They cover a wide range of crops and agricultural practices including pigeon peas, corn, sweet potatoes, plantain and bananas, cassava, pineapple, vegetables and bees. There are several crops which are of importance to Guyana for which there are apparently no bulletins, i.e. ground provisions, peanuts, cow-peas and citrus. There is variation among the bulletins in terms of quality and usefulness. Some are quite complete while others were rather elementary. In addition to the bulletins, the Ministry from time to time publishes The Farm Journal of Guyana, a non-technical publication written specifically for farmers, and containing articles of general interest to farmers. The use of published material is an appropriate extension technique in Guyana because of the high literacy rate. Since most Guyanese farmers can read, printed materials, which are both easy to read and agriculturally sound, provide a good medium for extension in Guyana.

The Communications Section also issues articles for the national newspaper, The Chronicle. There is usually one or two articles per week. The content of the articles varies from news items concerning such things as demonstrations or meetings to articles about particular agricultural practices.

The Agricultural Communication Office produces three radio programs, "Farming World," "Feed Back," and "At Your Service." "Farming World" is broadcast three days a week using an interview format and focusing on news items and farming hints. "At Your Service" is designed to answer farmers' questions and is scheduled one day per week. "Feed Back" is aired one day per week and is concerned with providing farming hints. As would be expected, the qualitiy of these program vary. Much is dependent on how good the questions are and the expertise of the persons answering the questions. It is a good extension medium because radio is very popular in Guyana. The Communications Section should devote more attention to these programs in order to assure that they are of a high quality and address the farmers' needs.

It is evident that the Division does have several mechanisms for publishing extension materials and other matters of interest and use to the farmers. It was not evident to the team whether or not the various media efforts address either the national agricultural priorities or the needs of the farmers. The Agricultural Communications Office, in concert with other extension and technical units, should design a publication program which addresses the key agricultural problems of the nation. Once a viable technical package has been developed, it should be systematically published in bulletins, on the radio and in the newspaper.

In summary, the program of the Division of Extension and Education reaches into every region of the country. It is the largest of the extension units and serves the largest clientele. The unit is concerned with promoting crops other than rice and sugar. There is a need for this unit to develop specific technical packages for each of the crops being promoted by the unit. Furthermore, there is a need for the service to

develop a systematic approach to farm visitation assuring that the producers are visited regularly and that the farmers are advised concerning production alternatives and strategies. The Division of Extension and Education needs to develop a routine procedure for data collection on each farm unit.

b. Ministry of Crops and Livestock--Division of Veterinary and Livestock Sciences

Also within the Ministry of Crops and Livestock is the Division of Veterinary and Livestock Science which has as one of its main functions the provision of extension services to private livestock producers. The structure of this Division parallels that of the Division of Extension and Education. The Division is headed by the PAO for Veterinary and Livestock Science, a veterinarian. He is assisted at the national level by a Production Manager-Veterinary Science and a Production Manager-Animal Husbandry. This division reflects the dual concern of the Division, i.e. animal health and animal production. The Division has responsibilities other than extension, i.e. research, health inspection, supervision of the abbatoirs, and other aspects of the livestock sector. It is the only Division in MCL with such diverse responsibilities. The other Divisions are either devoted primarily to research and related activities or to extension. Time and resources within the Division do not appear to be budgeted in terms of the various functions. It was difficult for the team to ascertain how much of the Division's resources are being allocated to each of its functions--extension, research, medicine.

At the regional level, there is typically a Veterinary Officer and/or a Livestock Officer. These officers supervise all aspects of the divisional program at the regional level. This, of course, includes the extension efforts. Below the Veterinary Officer and the Livestock Officer are Livestock Assistants. It is the Livestock Assistants who provide the routine extension services to the producer. When the situation warrants, a trained veterinarian or livestock production specialist becomes involved at the farm level.

There is some degree of specialization in the Division. Officers work primarily with certain livestock--cattle, swine, or poultry. This is made easier by the fact that production is often highly concentrated, especially poultry where a large portion of the industry is situated between Georgetown and the Timerhi airport. There is also some concentration of swine production. Certain areas, such as the Rupununi, are essentially cattle producing areas. Therefore, some Livestock Assistants have been able to specialize and develop expertise with regard to a given livestock.

The basic extension functions and responsibilities of the Division are:

1) The promotion of increased livestock production;

2) The education of livestock producers concerning animal husbandry and animal health practice using standard extension techniques;

3) The provision for basic veterinary services;

4) Procurement and sale of production and veterinary inputs.

It should be noted that the clientele of the Veterinary and Livestock Science Division are very often the same clientele as that of the Division of Extension and Education, i.e. small producers who engage in mixed farming with both crops and livestock. Typically, the personnel of this Division work out of the same regional offices as the Division of Extension and Education personnel. Only in livestock producing areas, like large sections of the Rupununi where there is virtually no commercial crop production, is there little overlap in clientele. However, for the most part of the country, there is indeed considerable overlap in clientele.

Most of the livestock producers in Guyana are small producers; i.e., they have only a few animals. With the exception of the poultry industry and a few sizable cattle operations, there are no large commercial livestock operations. It is important to gear the extension to small, limited resource producers.

The Division has been instrumental in forming producer groups, particularly among swine and poultry producers. In the Rupununi, there are many Amerindian cattle producers and they are organized at the village level. The village chief, as head of the village, typically serves as head of the group.

The Division has developed some extension materials in the form of bulletins. Also, it regularly provide material for the radio shows produced by the Communications Section of the Division of Extension and Education. Examples include: Rearing Layers, African Swine Fever, Castration, Improved Swine, and Animal Husbandry and Dairy Farming. The materials developed by the Division are generally of sufficient quality and should be useful to producers. The major weakness is that the subjects covered are very limited. There are only bulletins on a few subjects. The Division should devote more attention to this activity.

The Livestock Assistants and Officers conduct meetings, give demonstrations and make visits to producers, providing both veterinary and production information. Visits to the farmers do not appear to be on a scheduled basis. Rather, they seem to occur when the farmers request help from the Division. The Division's lack of transportation limits its ability to provide routine extension services to its clientele. Nevertheless, routine visits are necessary if the Division is to have a viable program.

A weakness that the extension program shares with other extension units is that most of the clientele of the Division are mixed farmers, and the Livestock Assistants only supply extension services for their livestock enterprises. They do not address the question as to how the livestock enterprise relate to the farmers' total production programs.

Perhaps the major weakness in the extension program of the Division is the fact that time and resources for extension are not explicitly budgeted, as mentioned above. Extension is only one of a number of important functions the Division performs in the livestock sector. There does not seem to be specific time or money set aside for extension. Rather, various officers have extension as one of their functions, so that it competes for time with other jobs. What is needed is specific schedules for extension. An officer's time should be explicitly budgeted in terms of the various functions he is asked to perform.

c. Ministry of Fisheries

There is no separate extension department in the Ministry of Fisheries. Instead, the extension activities are part of the research program, and are performed by research personnel. Extension activities are headquartered at the two research stations, Botanic Gardens and Onverwagt. In the proposed organizational chart, research and extension activities are divided between separate personnel. At the present time, however, with the shortage of staff, current professional staff members are responsible for research, extension and administrative duties.

Both fisheries stations have extension roles as a high priority. The Onverwagt Station has attempted to develop a commercially viable model for fish culture for the farmers to adopt. Training courses in brackishwater techniques were initiated in the early 1960's. The pattern of extension activities has tended to determine the research activities. As staff numbers and the level of staff competence increased, research quality and extension activities increased. However, with the loss of key staff over the last few years, there has been substantial reduction both in research and extension activities. At the present time, fish culture is not actively being promoted. The major effort in the last few years with fresh water and brackishwater fish culture has been supplying farmers with tilapia fingerlings. Given the fact that Fisheries has been elevated to the level of a Ministry, one expects additional funding and staffing. This is necessary if the Ministry is to have a viable extension program again.

The major extension effort with deep-sea fishermen has been to serve as an intermediary between them and international donor agencies. As processing plants and other facilities have been established, Fisheries personnel have promoted their use among fishermen.

farmers and research stations. As the Assistants deem appropriate, radio programs are prepared in which interviews with Fisheries staff are often included. The staff also prepares extension leaflets and bulletins that are distributed through the Communications Office of the Division of Extension and Education, Ministry of Crops and Livestock. The stations will also provide informal training for groups and indiviuals as requested. Interested farmers also take the initiative and contact the station for information and technical advice. Once again, due to a lack of personnel, there have actually been very little extension with farmers.

Some of the more important extension work takes place with Fishermen Cooperatives. The Ministry of Fisheries works closely with an association of sixteen Cooperatives. Total membership in Cooperatives is 968, of which about 700 members are active. The Ministry provides technical assistance and forms a link with other organizations. Cooperative members include both small and large boat owners. The Ministry encourages fishermen to gut their catch at sea in order to retard spoilage of the catch. The Ministry is also establishing a statistical reporting service designed to provide technical information concerning the various characteristics of the fishing grounds. This requires obtaining reliable information from the fishermen. Logbooks have been published and efforts are being made to encourage fishermen to use them. Training in areas such as Business Management. Fish Handling and Preservation, and Mechanical Repair and Maintenance are provided.

In summary, the Ministry of Fisheries has a defined extension program for both fresh and brackishwater fish producers and fishermen. At various points in the past, this program has been operational. At the present time, there is a lack of adequate staff and therefore, the program is not being actively implemented. With the establishment of the Ministry of Fisheries, one expects additional staffing and funding. This will be needed if the extension program is to function again.

d. Ministry of Forestry

Extension services directed by the Division of Forest Products is a major activity in the Ministry of Forestry. The major extension campaigns in recent years have centered around wood seasoning and preservation. These efforts have been supported by international, donors who have provided funding and technical assistance. The principal method used for these campaigns has been training courses.

There are two major functions of the current extension program in forestry. First of all, the Sawmilling Officer and Sawdoctor directly train people on the job in new and appropriate milling techniques. Regular visits to the mills are made to supervise and offer advice. Services of machinery, realignment, inspection and saw filing are routinely performed, in addition to the training. Other extension services provided by the Sawmilling Officer and Sawdoctor include timber grading and inspectons, appraisals and evaluation of sawmills for GAIBANK, and mak-

ing recommendations for import licenses.

The second extension function is more indirect. The Forest Resource Management Section of the Ministry has Forest Rangers and/or Forest Guards in all four districts. Although their primary responsibility is management of the forest resources, they provide an important field link with logging operations and sawmills. They advise forest industries and aid in species identification. They also transmit information in their informal contacts with people in the field. Information on new technologies and training courses can be transmitted rapidly by Forest Rangers and Guards, who primarily respond to requests. They are also used to inform clientele of training courses and other important news. Several timber producers were questioned concerning how often they were visited by Ministry personnel. They reported that they seldomly have contact with Ministry personnel. This seems to be primarily due to the remoteness of their logging operations and the lack of transporation in the Ministry.

The clientele for the extension activities of the Ministry are private loggers and milling operators. These vary in size from one person operations to large commercial enterprises. There are currently 113 sawmills in the country, including two run by cooperatives and nine by the State. Seven of the mills are very large and are responsible for 75 percent of the total production. The remaining 25 percent and operated by small producers.

e. Guyana Rice Board (GRB)

GRB, through its Research and Extension Division, provides extension services to rice producers in all of the major production areas in Guyana. The function of the Extension Officers is to advise rice farmers on the technical aspects of production-- seed, fertilizer, pesticides, cultural practices and water control. With the aid of the research produced by this Division, technical packages have been developed and are being promoted by the agents. The Extension Officers also conduct applied research in the various demonstration plots operated by GRB. In addition, when the research department develops new cultural techniques or recommendations, these are given local field trials by the Extension Officer in order to adapt them to the particular production area. GRB, with funding from USAID, is currently involved in an adaptive research project in the Black Bush Polder area which is attempting, as one of its major outputs, the development of an extension package to address the problem of the low yields in the area. The American team with their Guyanese counterparts are doing research on cultural practices and water usage. The findings from the study are feeding into the existing extension program.

The extension program in GRB is certainly the second most important extension effort in Guyana. Rice is the most important domestic crop and the second most important export crop.

The clientele served by GRB's extension program are typically small farmers with ten or fewer acres who engage in mixed farming. They produce other crops such as vegetables and/or livestock. This is true even in empoldered areas such as Black Bush Polder and Tapacuma. The extension program of GRB is designed to service only the rice enterprise and does not attempt to address the entire range of enterprises engaged in by the producers. This means that the producer is either serviced by other extension personnel who specialize in these other crops, or for crops for which MOA does not have extension services, the other enterprises are essentially ignored. In either case the best interests of the farmer are not served: either he receives fragmented advice about his total operation or advice is lacking for certain enterprises.

The GRB utilizes meetings, demonstrations, field days, seminars and other standard techniques in its extension program. There have been a number of extension bulletins published. In the past, the extension personnel have conducted several major campaigns. The most important was to persuade rice farmers to adopt the high-yielding varieties developed by the GRB research personnel.

The major strength of the extension program is the strong linkage it provides between applied research and rice production at the farm level. In actual fact, this model has not always worked well because it has proven difficult to generate producer-based technologies from research findings. Nevertheless, having research and extension in the same division is a step in the right direction. A major consequence of this arrangement is that the major emphasis of the research effort at GRB is to produce findings that will benefit the farmers and increase production. The Division of Research and Extension at GRB is probably the best example of an attempt in Guyana to integrate extension and research programs. It might well serve as a model for other organizations which are experiencing difficulty with developing useful extension materials from research findings. The major reason that GRB is experiencing some difficulty with its extension program is the lack of sufficient numbers of qualified personnel.

f. Mahaica-Mahaicony-Abary Agricultural Development Authority (MMA-ADA)

The MMA-ADA operates its own extension unit. Currently, the Authority is completing the infrastructure for water control on the Abary river. In preparation for new settlement and increased farming and livestock activities of existing producers, MMA-ADA has deployed its extension staff. In principle, the extension agents in the area are generalists able to deal with all crops and livestock. In actual practice, most of them work with rice and/or livestock, since they are the two most important commodities in the area. The extension staff in the Project area performs all of the functions of the Division of Extension and Education, the Division of Veterinary and Livestock Science and the GRB. Furthermore, the agents participate in various applied research projects carried out by the Authority.

At the present time, the MMA-ADA has not developed an extension program different from GRB or the Ministry of Crops and Livestock. It employs the same extension methodology and the same technical package, as well as the same extension publications developed by the other units. However, as the organization continues and applied research is carried out, the MMA-ADA should develop its own unique program, one which is based on the unique characteristics of agricultural production along the Abary river.

With regard to personnel, many of the key employees in MMA-ADA were previously employed by the Ministry of Crops and Livestock. Therefore, it should be expected that the extension unit would operate in much the same way as extension in MCL.

An important point to note about the MMA-ADA extension unit is that it does not seem to be serving a unique clientele or delivering a unique program. The only difference between its clientele and that of GRB. Division of Extension and Education, and the Veterinary and Livestock Division, is that their clientele happens to be living along the Abary river, the area currently serviced by the MMA-ADA. Furthermore, most of the extension staff were previously employed by other extension units and lack any special training or experience that would set them apart from officers in other extension units. The genesis of the separate unit seems to be a demand by IDB, the international donor for the project, that MMA-ADA be established a separate legal entity. Unless a unique programmatic function can be defined for this extension unit, which was not evident to the Baseline Study team, it should be reintegrated into the Ministry of Crops and Livestock. Such an arrangement would not preclude adoption of unique components of an extension program in order to meet special needs should they develop in the area of the Authority.

g. Guyana Sugar Corporation (GUYSUCO)

While GUYSUCO does not have an extension unit per se, extension functions are nevertheless performed. About 15 percent of the production of sugar cane is in the hands of about 2400 cane farmers. To assure that the cane produced by the private farmers is of sufficient quality for processing at the estate grinding factories, GUYSUCO specifies, as a condition for purchasing the cane from the private producers, the technical production package that the producer must adopt relating to variety, fertilizer, water control, and planting time. The cane farmers are organized into associations through which GUYSUCO delivers these packages. GUYSUCO employs Cane Farming Liaison Officers who meet with the various farmers and associations and who monitor the production to assure that it is done to specification. GUYSUCO appears to be quite successful in this effort. Of course, GUYSUCO controls the only market for cane and therefore is in a strong position to dictate the technologies the farmers must use. No other organziation has this much leverage in Guyanese agriculture.

The Other Crops Division of GUYSUCO provides some extension services to private producers of cassava. GUYSUCO operates two cassava mills and depends to a large degree on private producers for their supplies of cassava. There is a person in each cassava mill location assigned to work with the regular extension personnel and the farmers. There have been some problems with this program. The Baseline Study team visited the mill at Port Kaituma and discovered that local farmers are no longer growing cassava for the mill. The problem seems to be that a couple of years ago farmers were encouraged to grow cassava and about the time it was ready for harvest the mill closed leaving the farmers holding the crop. Since that time, farmers have been reluctant to participate. GUYSUCO must be able to demonstrate to the farmers that a steady market with a fair price exists before they can expect reasonable participation. In all fairness to GUYSUCO, it should be noted that the mill was not under GUYSUCO at the time that the problems occurred. Nevertheless, GUYSUCO must solve the problem if it is to gain farmer participation.

In recent years the Other Crops Division has taken on a number of different crops at the encouragement of the Government. GOG feels that tit has the management skills necessary to run a successful operation. Most of its efforts have not depended on production from the private sector. The need for an extension service in this unit will depend on whether future projects involve private farmers. It was the judgment of the Baseline Study team that GUYSUCO is adding new enterprises at too fast a rate. It would be betterwise for GUYSUCO to develop its production and processing techniques for its existing enterprises before it takes on additional ones.

h. Guyana Agricultural and Industrial Bank (GAIBANK)

GAIBANK's role in the agricultural sector is to provide the necessary credit for agricultural inputs needed by the private producers in Guyana. However, in structuring loans and determining the credit worthiness of producers, GAIBANK Credit Analysts perform functions and offer advice that are of an extension nature. In order to ascertain the probability that a given farmer will be able to repay a loan as scheduled, the Credit Analyst must be able to assess the viability of the farmer's operation, farm enterprises, technical input, management and capability and marketing possibilities. If he judges certain elements of the package to be deficient, he must be able to propose, or even require as a condition of the loan, changes in the farmer's practices or enterprises. Thus, the technical and managerial advice supplied by the personnel of GAIBANK to the farmer is often of an extension type. Furthermore, the sort of relationship that the loan officer has with the farmer is different than that of a typical officer of a regular bank. The agricultural bank provides credit to borrowers who would typically experience difficulty obtaining a loan from a regular bank. Usually, the banker is concerned only with matter such ascollateral and profit and loss statements. On the other hand, with the farmer, who would often be judged a poor risk by normative banking standards, the person evaluating the loan application must be able to judge the probability of a given set of farm

enterprises and be able to recommend remedial changes. Loan applications are typically processed without input from any of the regular extension units. Therefore, it is essential that GAIBANK employees be able to judge and advise on technical aspects of agriculture.

The Credit Analysts, assisted and supervised by Assistant Senior Credit Analysts, are the GAIBANK personnel who have actual contact with the clients, the farmers. The Credit Analyst takes the application from the farmer and supplies the bank with the necessary information for it to be able to make a decision concerning the loan. He performs the evaluation and appraisal and recommends to the Assistant Senior Credit Analyst, who recommends to the Regional Manager, who in turn recommends to the Manager. The Credit Analyst does not make decisions concerning the granting of loans. He only supplies the necessary data. It is in Georgetown that the actual decision is made. The period is often lengthy, and the farmer must travel to Georgetown to sign the loan agreement. GAIBANK personnel recognize the fact that the loan process is cumbersome and not coordinated with either extension units or marketing organizations. The problem is addressed by GAIBANK with the Food Crop Production and Marketing Programme, which is funded by the Inter-American Development Bank. The project, which is in an early phase, is attempting to integrate the credit system with extension and marketing by establishing Farmer Service Centers at key locations in the country. They will serve as "one stop" places where the farmer can obtain technical advice, credit and marketing services.

If the Food Crop Production and Marketing Programme proves successful, it may be possible to shift at least some of the functions now performed by the Credit Analysts to extension personnel. This might require some financial training for extension agents, but it could benefit both the extension and credit programs in the long run. It would certainly reduce needed personnel.

i. Conclusion

Over the last couple of decades, agricultural extension in Guyana has become highly fragmented. At the time of independence the extension service was essentially under one unit. Since that time, there has developed specialized extension units in almost every organization, e.g., crops, rice, livestock, credit, fisheries, etc.. Because of the nature of Guyanese agriculture, i.e., small mixed farming operations, several extension units often serve the same clientele. It is not unusual for three or more units to provide services to the same individual farmers. Moreover, most of the extension personnel have received the same professional training. Given Guyana's financial situation and shortage of trained personnel, a unified extension organization shoud be established. This would result in a more efficient use of Guyana's limited pool of trained extensionists, and also provide better service to the farmers.

3. Resource Allocation for Extension

a. Methods for Determining Resource Allocations

It often proved difficult to obtain specific budget information for extension efforts from the MOA or the various state corporations. In some cases, extension allocations in terms of personnel and budget were not separated from research, production and other efforts. In other cases, only rough estimates were available. In still others, no data were available. With regard to the MOA, budget for personnel and some recurrent cost data were obtained from Estimates: Current and Capital of Guyana for the Year 1980 as Presented to the National Assembly. This document contains budget allocations for the years 1977-80. This was supplemented with data obtained from officials in the various Divisions and Ministries who were able to supply figures concerning actual personnel and capital budgets.

With regard to the various state corporations, data concerning resource allocation was obtained for several years in an attempt to demonstrate trends. Financial data were not always available to the team. Either the officials involved in the interviews did not have access to it or it could not be made public at that particular time. The state corporations proved particularly difficult in terms of obtaining information. Nevertheless, a great deal of budget data was obtained and certainly generalizations can be made concerning the funding of extension units. Data indicate that extension efforts in Guyana are currently underfunded. With the current financial situation in the country the Government has been primarily interested in maintaining the structure so that it will be in place when the financial crisis lifts. Retrenchment has been the rule in the last few years.

Personnel levels were obtained through a combination of interviews and published reports. Once again, the most complete data were available for the various ministries. As with the budget information, it was often difficult to separate extension personnel from other personnel or to divide a given officer's time in terms of how much was devoted to extension and how much to other activities, such as research and administration. If a person was judged to perform extension functions, he/she was counted as an extension officer. This, of course, tends to overstate the number of personnel involved in extension.

b. Financial Allocations for Extension

Table 4.3.2 contains information concerning the financial allocations for extension made by Ministries and the GRB for 1979. The Division of Extension and Education had a recurrent budget of G$ 338,934 and a capital budget of G$ 628,000 for the year. The largest single item in the operating budget was G$ 100,000 for transportation and traveling with an additional G$ 46,000 for operation and maintenance of land and water transport. Other major items in the operating budget were production and distribution of seeds, maintenance of facilities, and a general

Table 4.3.2

BUDGET FOR SELECTED EXTENSION UNITS IN GUYANA, 1979

Extension Unit	Recurrent (G$)	Capital (G$)
Division of Extension & Education	338,934	628,000
Division of Livestock & Veterinary Science	235,800	43,356
Ministry of Fisheries	22,747	46,358
Ministry of Forestry	200,000	-
Guyana Rice Board	563,309	5,000

SOURCE: The data were obtained from Annual Reports and personnel interviews. The figures for the Guyana Rice Board were obtained by dividing the Budget for Research and Extension in half. This assumes that half of this division's effort went to extension and half went to research. A similar procedure was used to estimate extension expenditures in the Division of Veterinary and Livestock Sciences. The figures in the table are one half of the recurrent and capital budget of the Division.

item for extension activities. The personnel of this Division reported that given the shortage of transportation and extension personnel, the recurrent budget seemed sufficient. If the Division was staffed properly and had adequate transporation, the current level of funding would be grossly inadequate. Given the current situation, the Division cannot efficiently spend additional funds. The capital budget for the Division, which was G$ 628,000 for the year, posed a different problem. The capital appropriation was for such things as construction of housing, new boats and motors, repairs on equipment, etc. The PAO reported that there had been a similar appropriation for the last few years. The money has yet to be spent, because the Division is unable to get the necessary licenses to purchase equipment or contract with the relevant persons to make repairs or do construction. Therefore, he indicated that a larger appropriation was not needed. Rather, he needed the ability to spend the money that has already been approved. The Division apportions the national budget regionally in terms of the budget requests and plans of work submitted by the Agricultural Officers. The point should be clearly made that if the Division was fully staffed and if transportation was up to par and needed goods could be purchased, the Division would certainly need additional funding. The current situation in which the level of funding appears to be sufficient is a result of the fact that the Division has undergone a period of retrenchment in program and personnel.

The total operational budget for the Division of Veterinary and Livestock Science was G$ 471,600 for 1979, and the capital budget was G$ 86,712. There was not a separate budget for the extension activities within the Division. After talking with Division personnel, it was the teams' judgment that a reasonable estimate of extension expenditures would be 50 percent of the total budget. This would mean that the operational budget was G$ 235,800 and the capital budget was G$ 43,356. As with the Division of Extension and Education, the largest portion of the operational budget for this Division went to transportation and the maintenance of transportation equipment. It was noted that additional funds were needed for these items. Currently, transportation is a major problem, and it has proven difficult to keep vehicles and boat engines repaired. With regard to capital expenditure the Division is in the process of building a veterinary diagnostic laboratory which will be used as a research facility and also provide diagnostic services to individual livestock producers. With this latter function, there will be a major extension element. As with the Division of Extension and Education, this Division seems to have been in a period of retrenchment. The program is due additional funding.

The Ministry of Fisheries reported a modest operating budget of G$ 22,747 and a capital expenditure budget of G$ 46,358 for research and extension for the year 1979. Since, in actual fact, there is little or no research going on at the present time at the research stations, these amounts are extension expenditures. The monies are primarily used to produce fingerlings and to maintain the ponds. It should be noted that the budgets for 1980 were substantially higher with G$ 44,944 for operations and G$ 130,935 for capital expenditures. Given the lack

of personnel within the Ministry it may well be that the current budget is all that is needed. The Ministry is in a state of flux because of its recent reorganization and it is not yet clear that the staff will be increased. Should the Ministry gain additional staff and expand its program, there will be a need for substantially higher budgets.

The extension budget for the Ministry of Forestry was G$ 200,000 for 1979. There was no capital budget for extension reported. The monies, partially provided by a CIDA project, are largely used for training programs.

The GRB has a single budget for research and extension. In 1979, the operational budget for this Division was G$ 1,126,619 and the capital budget G$ 10,000. There was no precise way to determine the extension portion. In terms of personnel, however, there were about equal numbers of professional extension workers and research professionals. If the same proportion holds for the budget, the estimated operational expenditure for 1979 is G$ 563,309 and the capital expenditures G$ 5,000. It should be noted that the total budget for research and extension has varied greatly over the past five years, ranging from a low of G$ 710,686 to a high of G$ 1,554,976 in 1980. Similarly, the capital budget ranged from a low of G$ 10,000 in 1979 to a high of G$ 84,000 back in 1976.

Budgetary data were not available for the other extension units. In summary, while the various extension units appear to be underfunded in in absolute sense, they may well lack the personnel, to spend substantially higher amounts of money. However, as staffing is increased and the programs are operated at expanded levels, budgets must be increased.

c. Extension Personnel

One of the major problems faced by most extension units is staffing. No place was this more evident than with the Division of Extension and Education. In 1980, there were 124 professional level positions allocated to the Division (see Table 4.3.3). Of these, only 53 positions were actually filled and 71, or 57 percent, were vacant. These vacancies occurred at all levels of the Division. Only one out of three positions for Senior Agricultural Officers was filled. Sixteen out of 28 Agricultural Officer slots were vacant and almost three-fifths. 53 out of 90, of the Agricultural Field Assistant positions were vacant. This situation is not new to the Division. A review of the staffing level for the last three years shows that while the problem may have worsened somewhat in recent years, it is not new. Table 4.3.4 shows data for 1978-80. The number of allocated positions was the same for the three years - the levels reported above for 1980. In 1978, there were 59 agricultural professionals employed in the Division. It dropped by one to 58 in 1979 and down to 50 by 1980. As will be discussed later, the problem seems to be (1) a lack of sufficiently trained personnel in Guyana; and (2) the inability of the Division to compete successfully with other units in terms of salary and other job benefits. Other organiza-

Table 4.3.3

SUMMARY OF POSITIONS ALLOCATED, FILLED AND VACANT, FOR THE DIVISION OF EXTENSION AND EDUCATION, 1980

Position	No. Allocated	No. Filled	No. Vacant	% Vacant
Principal Agricultural Officer	1	1	0	0
Senior Agricultural Officer	3	1	2	67
Agricultural Officer	28	12	16	57
Curator, Botanic Garden	1	1	0	0
Bee Officer	1	1	0	0
Agricultural Field Assistants	90	37	53	59
TOTAL	124	53	71	57

SOURCE: The data for number of positions allocated were obtained from Estimates: Current and Capital of Guyana for the Year 1980, as Presented to the National Assembly. The data for number of positions filled were obtained from a draft of the 1980 Annual Report, Division of Extension & Education, Ministry of Agriculture.

Table 4.3.4

NUMBER OF EXTENSION PERSONNEL BY POSITION, 1978-80 DIVISION OF EXTENSION AND EDUCATION

Position	1978	1979	1980
Principal Agricultural Officer	1	1	1
Senior Agricultural Officer	1	2	1
Agricultural Officer	13	15	12
Senior Agricultural Field Assistant	1	1	1
Agricultural Field Assistant	43	39	35
TOTAL	59	58	50

SOURCE: Division of Extension & Education, Ministry of Agriculture

tions, especially state corporations, pay higher salaries and seem to have better job perquisites. Regardless of the cause, the program of the Division is severely hampered by the lack of personnel. Approximately 60 percent of the work of the Division is not being performed because 60 percent of the positions are vacant. Regardless of how good the program may be in terms of design and methodology, it cannot be successfully executed without adequate staff. The Division of Extension and Education is certainly due for a major effort to staff vacant positions.

To a lesser but still important degree, a similar problem exists in the Division of Veterinary and Livestock Science. In 1981, there were 76 positions allocated (see Table 4.3.5). Of this number, 49 were filled and 27, or 36 percent, were vacant. Once again, the vacancies occurred at all levels. Five out of nine, or 56 percent, of the positions for Veterinary Officers were empty. Likewise, six out of nine, or 67 percent, of the Livestock Officers were empty. There were 11 vacancies out of 40 allocated positions for Livestock Assistants I: for a 28 percent vacancy. Finally, five, or 63 percent, of the Artificial Inseminator positions were vacant. Given the shortage of personnel in the Division, several regions are currently without services of a veterinarian and others are understaffed. The livestock sector, especially cattle, has experienced major problems in recent years. Herd size and meat production have decreased. Without an adequately staffed Division to promote an aggressive extension program, the problems will probably get worse.

Table 4.3.6 contains data for position allocations in the Ministry of Fisheries. As noted previously, Fisheries personnel have research and production responsibilities, as well as extension functions. Currently, there are 10 positions allocated at the Fisheries Officer level or below. Out of these, 7 are filled and 3, or 30 percent, are vacant. The three vacancies are the Fisheries Assistant II-Marine, the Fisheries Assistant II-Inland and the Fisheries Field Assistant-Marine. As noted earlier, Fisheries has recently received Ministry status, but staff allocations have not been increased. Given the fact that Fisheries has recently achieved Ministry status, one should expect a growth in its program and staff. The current staffing situation does not allow for a viable extension program. For the Ministry to have an extension program which could have an effect on fish production, it is necessary for it to increase its level of staffing by more than double. This, of course, is going to require much higher levels of funding than exists at the present time.

Table 4.3.7 lists the positions in the Ministry of Forestry which have extension functions. In 1981, there were 34 positions, 1 Sawmilling Officer, 1 Sawdoctor, 16 Forest Rangers and 16 Forest Guards. The Ministry reported that all positions were filled, so that the Ministry of Forestry is the only one not facing critical personnel shortage in the extension sector.

Table 4.3.5

SUMMARY OF EXTENSION POSITIONS ALLOCATED,* FILLED AND VACANT, FOR THE DIVISION OF VETERINARY AND LIVESTOCK SCIENCES, 1980

Position	Number Allocated	Number Filled	Number Vacant	% Vacant
Principal Agricultural Officer-				
Veterinary & Livestock Science	1	1	-	-
Production Manager-Veterinary	1	1	-	-
Production Manager-Animal				
Husbandry	1	1	-	-
Senior Veterinary Officer	1	1	-	-
Senior Livestock Officer	1	1	-	-
Veterinary Officers	9	4**	5	56
Livestock Officers	9	3***	6	67
Poultry Officer	1	1	-	-
Senior Livestock Assistant	1	1	-	-
Livestock Assistant II	3	3	-	-
Livestock Assistant I	40	29****	11	28
Artificial Inseminator	8	3	5	63
TOTAL	76	49	27	36

SOURCE: Division of Veterinary and Livestock Sciences, Ministry of Crops and Livestock.

*It should be noted that not all of these persons are 100% extension. They have research, production and other responsibilities. However they do have some extension function and are therefore listed here.

**There are also two Veterinary Officers on Study Leave and one seconded to REPAHA. They are not included in this figure.

***There are also four Livestock Officers currently on study or other leave from the Division. They are not included in this figure.

****There are eleven Livestock Assistants I on study leave at the present, and they are not included in this figure.

Table 4.3.6

SUMMARY OF MINISTRY OF FISHERIES EXTENSION-TYPE POSITIONS ALLOCATED FILLED AND VACANT, 1981

Position	Number Allocated	Number Filled	Number Vacant	%Vacant
Fisheries Officer-Marine	1	1	-	-
Fisheries Officer-Inland	1	1	-	-
Senior Fisheries Assistant Marine	1	1	-	-
Senior Fisheries Assistant Inland	1	1	-	-
Fisheries Assistant II-Marine	1	-	1	100
Fisheries Assistant II-Inland	1	-	1	100
Fisheries Assistant I-Marine	1	1	-	-
Fisheries Assistant I-Inland	1	1	-	-
Agricultural Field Assistant Marine	1	-	1	100
Agricultural Field Assistant Inland	1	1	-	-
TOTAL	10	7	3	30

Table 4.3.7

SUMMARY OF MINISTRY OF FORESTRY EXTENSION-TYPE POSITIONS ALLOCATED, FILLED AND VACANT, 1981

Position	Number Allocated	Number Filled	Number Vacant	% Vacant
Sawmilling Officer	1	1	-	-
Sawdoctor	1	1	-	-
Forest Ranger	16	16	-	-
Forest Guard	16	16	-	-
TOTAL	34	34		

SOURCE: Interview with Ministry of Forestry Personnel.

Table 4.3.8 contains data showing allocated, filled and vacant positions for extension-type personnel at GAIBANK. In 1981, there were 74 positions for the three categories of Credit Analyst allocated at GAIBANK. Of these, 36 were filled and 38, or 51 percent, were vacant. The position with the largest proportion of vacancies was that of Senior Credit Analyst. Only one of the ten allocated positions was filled. Nine (35 percent) of the Assistant Senior Credit Analyst slots were empty and 20 out of 38 (53 percent) Credit Analyst jobs were vacant. Thus, it is safe to say that at the local level, the level of contact with the farmer, GAIBANK is understaffed. Given the importance of credit to agricultural production and the wellbeing of the farmer, this is a critical situation. In the past, GAIBANK has experienced problems in delivering credit in a timely fashion. Lack of staff is surely a major reason. Merging some of the functions of GAIBANK with the Division of Extension and Education, both of which are grossly understaffed, would benefit both organziations.

Unfortunately, only two of the state corporations involved in extension, GRB and MMA-ADA, were able to provide useful figures concerning personnel. Table 4.3.9 provides the information for GRB. There were 25 extension positions allocated in 1981. Of these, 23 were filled and two (8 percent) were vacant. There is a vacancy for the position of Head of the extension unit in one of the project areas; this position calls for an agronomist. There is also a vacancy for a Field Officer. GRB compares favorably with the other extension units in terms of staffing. Similarly , MMA-ADA has been able to fill its extension positions (see Table 4.3.10). There were 11 positions allocated, one Agricultural Officer for Extension and 10 Agricultural Field Assistants. All positions were filled.

In summary, a serious shortage of personnel exists in the various extension units in Guyana. This shortage is most acute in the Ministries especially in the Division of Extension and Education and the Division of Veterinary and Livestock Science. GAIBANK also has a relatively large number of vacancies. It is difficult to address the question as to whether or not additional positions should be allocated. One does not know how well the system would work if it was fully staffed. The immediate task in terms of personnel in the coming years will be to fill vacant positions with qualified professionals. Agriculture is too important to the nation, and extension is too important a tool for its advancement, to let the situation remain unchecked. Priority should be given to the training of additional high quality extension personnel.

4. Physical Facilities, Equipment and Materials

With regard to facilities and equipment, the most pressing need expressed was for transportation. There was a lack of sufficient numbers of vehicles, outboard engines, and other modes of transportation, as well as a lack of facilities to repair them. These problems were particularly evident in the Division of Extension and Education. The PAO re-

Table 4.3.8

SUMMARY OF CREDIT ANALYST POSITIONS ALLOCATED, FILLED AND VACANT FOR GAIBANK, 1981

Position	Number Allocated	Number Filled	Number Vacant	% Vacant
Senior Credit Analyst	10	1	9	90
Assistant Senior Credit Analyst	26	17	9	35
Credit Analyst	38	18	20	53
TOTAL	74	36	38	51

SOURCE: Interview with Personnel at GAIBANK, January 1981.

Table 4.3.9

SUMMARY OF POSITIONS ALLOCATED, FILLED AND VACANT FOR THE EXTENSION UNIT OF GUYANA RICE BOARD, 1981

Position	Number Allocated	Number Filled	Number Vacant	% Vacant
Head Agronomist	2	1	1	50
Field Supervisor	4	4	-	-
Field Officer	14	13	1	7
Extension Specialists	5	5	-	-
TOTAL	25	23	2	8

SOURCE: Guyana Rice Board

Table 4.3.10

EXTENSION STAFF POSITIONS BY LEVEL OF TRAINING - MMA-ADA, 1981

Position	Number	Training Level
Agricultural Officer for Extension	1	BSc.
Agricultural Field Assistants	10	Diploma/Certificate

SOURCE: Information was obtained from the Agricultural Program Manager, MMA-ADA.

ported that last year (1980) Landrovers in the Division were not functioning 41 percent of the time, the nine outboard engines used in river transportation were broken down 58 percent of the time, and three districts were without working transportation for the entire year. The Division had funds for the repair of transportation equipment, but experienced difficulty locating spare parts and employing mechanics to do the work. Furthermore, funds were allocated for the purchase of additional equipment. However, because of an inability to obtain the necessary permission to import the equipment, the monies went unspent. Transportation is vital to the work of this Division. On the coast, public transportation can be used. However, boats are necessary to service the farmers up the rivers and creeks, and Landrovers are essential in the hinterland where public transportation does not exist and the population is sparsely settled. Transportation problems are not unique to this Division. Similar problems were mentioned by the Ministries of Fisheries and Forestry, as well as the Division of Veterinary and Livestock Science. All of these units noted that their work was hampered, and often stopped, because of a lack of transportation. The problem is serious and in need of remediation. A common complaint heard from extension workers in the field is that without transportation they are confined to the District or Regional office.

The various headquarters for the extension units, most of which are in Georgetown, and two at Mon Repos, seemed either good or adequate. Overall they had sufficient equipment and supplies, although some were in bad and several were in the process of being repaired. Team members visited several regional extension offices and found the situation to be less desirable. Some of the facilities were in extremely bad repair and most lack sufficient office furniture and supplies. While there is certainly room for improvement in facilities, this should be given lower priority than things like personnel, program and transportation.

With regard to equipment, several officials noted the need for more audio-visual equipment and materials. It was noted that slide and film presentations were particularly successful with farmers. The Division of Extension and Education has recently purchased some equipment, but expressed a need for more. Reference books and materials on agriculture are also needed. It was the impression of the Baseline Study Team that most of the units are functioning at such a low level due to the lack of personnel that it is difficult for the officials in these units to assess accurately their equipment needs. However, once the personnel problem is solved, there will certainly be a need to focus on this problem.

Furthermore, at the present time extension units are not actively promoting a true extension program. Rather, they are dealing with routine matters such as supplying seed, fertilizer and plants, responding to farmer requests and carrying out routine responsibilities. Once an extension program is designed and implemented, there will be increasing need for equipment. Until that time, there is little need for it.

5. Extension Linkages and Networks

Each of the extension units had established linkages with other agricultural organizations and some with international institutions (see Table 4.3.11). The Division of Extension and Education reported a number of them. There is a strong link between the Division and GSA, because most of the AFA's employed by the Division were trained there. Furthermore, the school is near the headquarters of the Division, namely Mon Repos. There is a strong link with the Division of Veterinary and Livestock Science at the regional level: the personnel of the two Divisions share offices and in the absence of a Veterinary or Livestock Officer the veterinary and livestock personnel are under the Direction of the Agricultural Officer. Strong links also exist between the Divisions of Crop and Soil Sciences in the Ministry of Crops and Livestock: the various divisions collaborate on research activities and work together on extension bulletins and other publications. Furthermore, the agronomists and soil scientists serve as specialists to aid in technical problems encountered by the extension personnel. There is an especially important linkage with GRB, since in the Black Bush Polder area Division personnel work directly under the supervision of GRB specialists in the rice extension program. There is a weaker link with MMA-ADA, since the Authority has replaced the Division personnel in the project area. However, ties still continue. The Division also has strong links with GAIBANK and GPC. These ties are being strengthened with the Food Crop Production and Marketing Programme funded by the Inter-American Development Bank. The project requires the establishment of seven Farm Service Centers where the activities of the Division of Extension and Education, GAIBANK and GMC will be coordinated. The idea is to provide the farmer with a single place for extension, credit and marketing, and to make certain that the institutions coordinate their activities.

The Division of Veterinary and Livestock Science reported a number of important linkages. As mentioned above, it has a strong tie to the Division of Extension and Education. There is also a close link with GSA, where the Division supplies lecturers and shares library resources. A similar relationship exists with REPAHA. The Division provides consultant services to the livestock components of GUYSUCO and MMA-ADA. There is an especially strong relationship with LIDCO where the PAO for Veterinary and Livestock Science is Chairman of the Board, and other Division personnel regularly provide consultations. The PAO reported that the Division was regularly involved in the livestock programs of the MOE (Ag). The Division also cooperates with the Ministry of Health on public health matters. Internationally, the Division ties to various Caribbean organizations and to a school of veterinary medicine in the US.

The only organizations with which the Ministry of Fisheries has linkages with are the Biology Department at UG and the Fish Culture Project of GUYSUCO. The former provides technical advice on research, and the Ministry provides fingerlings to the latter. In addition, the officials reported that extension materials for fisheries was published through the Communications Office of the Division of Extension and Edu-

Table 4.3.11

EXTENSION LINKAGES

Extensive Unit	GPC	CC	UG	GSA	ODE Inst.	MCL V&L	MCL Ext.	MPI	MPo	MID	MCL/CS	MCL/SS	GUYSUCO	GRB	MMA-ADA	GAIBANK	IRC	FU	MOE	REPAHA	LIDCO	MOH
Division of Extension & Education	x			x		x					x	x		x	x	x						
Division of Veterinary & Livestock		x		x			x						x		x			x	x	x	x	x
Ministry of Fisheries			x				x						x				x					
Ministry of Forestry	x		x									x								x		
GAIBANK	x					x	x							x	x						x	
GUYSUCO			x	x				x		x					x		x					
GRB							x			x	x	x			x	x						
MMA-ADA							x			x	x	x	x	x		x						

cation. A linkage exists with Auburn University because Auburn has provided technical advice and training. The Ministry also works with Guyana Fisheries Limited.

The Ministry of Forestry works with several organizations. UG assists the Ministry in sampling efforts and UG faculty participate in carrying out performance tests on certain species of wood. The Ministry also works with the Ministry of Energy and Natural Resources, the Ministry of Land and Surveys and the MOA in preparing maps from aerial photographs. The Ministry also advises MOA on the status of forest resources. Primary and secondary students are advised on forestry projects. The Ministry assists GPC in the identification of plants and trees which are of medicinal value. Of course, the Ministry works closely with the Timber Export Board.

GAIBANK maintains working relationships with the various extension units, especially the Division of Extension and Education, the Division of Veterinary and Livestock Science, GRB, MMA-ADA, and LIDCO. GAIBANK services the same sets of clients as these units do. As mentioned in the paragraph dealing with the Division of Extension and Education, GAIBANK is currently involved in the IDB project which requires active participation and cooperation of this Division and GMC. With regard to GAIBANK, it was the authors' consensus that it needs to be much more closely tied to the various extension units. This is recommended, because an extension officer should provide judgement concerning a given farmer's potential with any given agricultural enterprise.

GUYSUCO reported close ties with both UG and GSA, where they provide lecturers and seek expert advice. Personnel from the Ministry of Fisheries have been regularly involved in the GUYSUCO fish culture activity at the Blairmont Estate. Also there, GUYSUCO is involved with MMA-ADA because the Authority will provide the sugar estate with a new and closer source of water for irrigation. GUYSUCO reported close ties with various international sugar organizations. Finally, GUYSUCO has linkages with the Ministry of Irrigation and Drainage in water control matters.

GRB evidenced a number of important linkages. First of all, GRB-Extension works closely with the Division of Extension and Education, especially in the Black Bush Polder area, where the Division's personnel are supervised by GRB personnel in delivering GRB technical packages to the rice farmers. In problems related to water control, GRB personnel work directly with personnel from the Ministry of Irrigation and Drainage. Some technical advice and analyses are provided by the agronomists and soil scientists at the Ministry of Crops and Livestock. The MMA-ADA linkage is an important one because the Authority has assumed the extension role for rice production in the project area.

The final set of linkages to be discussed are those associated with MMA-ADA. Already mentioned are the ties to the Division of Extension and Education and GRB. MMA-ADA also seeks technical advice from the crop and soil scientists at the Ministry of Crops and Livestock. The

connections with GRB, GAIBANK and GUYSUCO have been discussed above. Since this is a new organization, one can expect other important linkages to develop.

In summary, there is evidence of a great amount of coordination and cooperation between the various extension units and other agricultural institutions. However, it is the thinking of the authors that, at the minimum, there should be a more structured and formal linkage between the various extension units, because there is a great deal of commonality in clientele. Given the shortage of extension personnel coupled with common clientele, a better solution would be the reintegration of at least some extension units into an administratively single unit. Officials of the various organizations should start meeting to consider how their extension efforts might be made to work together for everyone's benefit.

6. Financial and Professional Incentives for Extension

Given the key importance of personnel to any extension program and given the fact that many of the extension units in Guyana face critical problems staffing their programs, it is important to review the financial and other incentives provided by the several units. There are at least three types of incentives--financial, working conditions and professional opportunities. Each of these types of incentives are reviewed below.

a. Financial Incentives

The salaries for all of the MOA personnel and its sub-Ministries are set by the Public Service Ministry. There have been no changes in the salary structure in the last five years. Tables 4.3.12-4.3.15 contain salary information for personnel in the Division of Extension and Education, Division of Veterinary and Livestock, Ministry of Fisheries and Ministry of Forestry. In absolute terms, the salaries are low. The salary for the PAO in the two MCL Divisions is G$ 12.384 per year and other salaries range below that. Production Managers in the Division of Veterinary and Livestock Science receives G$ 11, 640 and the Agricultural Field Assistant in the Extension Division receives an average salary of G$ 4,359. While there is some variation, the salaries are similar in the Ministry of Fisheries and Ministry of Forestry. There are also duty allowances for Ministry personnel. Examples are shown in Table 4.3.12 the for Extension Division; they are similar for other Ministry personnel. They range from a low of G$ 600 for an AFA to a high of G$ 2400 for a PAO. In addition there is often a housing allowance or a government house provided at a very low price. There was wide spread dissatisfaction with the salary scales. The Baseline Study team witnessed a great deal of low morale among extension personnel. It wasdue to a general feeling that salaries are much too low.

Table 4.3.12

SALARY SCHEDULE FOR DIVISION OF EXTENSION AND EDUCATION PERSONNEL 1980

Position	Position Rating	Mean Salary for Position (G$/year)	Yearly Duty Allowance (G$)
Principal Agricultural Officer	A33	12,384	2,400
Senior Agricultural Officer	A27	10,084	1,800
Agricultural Officer	A24/A21	7,112	1,500
Agricultural Field Assistant	A15/A13	4,359	600

SOURCE: Salary and Rating data were obtained from Estimates, Current and Capital of Guyana for the Year 1980. Mean salaries were computed by dividing the total allocation for each positional categories by the number of positions. Duty allowance information was obtained in an interview with the Principal Agricultural Officer for Extension and Education, Ministry of Agriculture.

Table 4.3.13

SALARY SCHEDULE FOR THE DIVISION OF VETERINARY AND LIVESTOCK SCIENCE, 1981

Position	Position Rating	Mean Salary for Position (G$/yr)
Principal Agricultural Officer-VLS	A33	12,381
Production Manager-Veterinary	A31	11,640
Production Manager-Animal Husbandry	A31	11,640
Senior Veterinary Officer	A28	10,776
Senior Livestock Officer	A27	10,488
Veterinary Officer	A26	9,830
Livestock Officer	A24	7,187
Poultry Officer	A24	7,104
Senior Livestock Assistant	A17	5,304
Livestock Assistant II	A15	5,176
Livestock Assistant I	A15/A13	4,372
Artificial Inseminator	A15/A13	4,526

SOURCE: Salary and Rating data were obtained from Estimates: Current and Capital of Guyana for the Year 1981. Mean salaries were computed by dividing the total allocation for each positional category by the number of positions.

Table 4.3.14

SALARY SCHEDULE FOR MINISTRY OF FISHERIES/EXTENSION TYPE PERSONNEL BY POSITION, 1981

Position	Lowest Salary (G$)	Highest Salary (G$)
Fisheries Officer	6,816	9,732
Senior Fisheries Assistant	6,816	9,732
Fisheries Assistant II	5,544	7,680
Fisheries Assistant I	4,416	5,940
Agricultural Field Assistant II	4,920	6,456
Agricultural Field Assistant I	4,416	5,940

SOURCE: Ministry of Fisheries Personnel, February 1981.

Table 4.3.15

SALARY SCHEDULE FOR THE MINISTRY OF FORESTRY EXTENSION-TYPE PERSONNEL, 1981

Position	Lowest Salary (G$)	Highest Salary (G$)
Sawmilling Officer	11,400	15,600
Sawdoctor	5,508	7,740
Forest Ranger	4,872	6,672
Forest Guard	3,948	5,208

SOURCE: Ministry of Forestry Personnel, February 1981.

Data were not available for personnel in the State Corporations. However, it is common knowledge that the State Corporations pay higher salaries and offer more perquisites and are thus able to attract personnel away from Ministries. This is a particular point of dissatisfaction with Ministry personnel. There is a general feeling that salaries should be equalized between the state corporations and the Ministry. The suggestion, of course, is to raise Public Service salaries and not to lower State Corporation salaries. This is a difficult problem, because one of fiscal steps GOG has taken to ease the balance of payments problem is freezing Public Service salaries. Commitments have been made to international financial institutions on this matter.

Nevertheless, the problem must be addressed. Unless it is, there will continue to be dissatisfaction in the Ministries, and even worse, a great deal of attrition. At the present time, there is a great deal of movement from the Ministries to the state corporations and this severely weakens the extension program. The Baseline Study team talked to numerous personnel in the State Corporations who reported that they had been employed previously in one of the Ministries but left to work for a State Corporation because of the income differential. Furthermore, numerous existing Ministry personnel indicated a desire to work for a State Corporation for the same reasons.

Competition between the Ministries and the State Corporations is not the only problem with regard to salaries. Surrounding Caribbean countries and employers in other areas of the world pay substantially higher salaries than a person can expect to receive in Guyana. This serves to encourage personnel to seek employment out of Guyana. Over the last few years, a number of key extension and other agricultural personnel have emigrated from Guyana. The Government recognizes this problem. Officials reported that it is increasingly harder to get students to return to Guyana from foreign study because the students locate better employment opportunities elsewhere. Guyana cannot continue to lose its trained agricultural personnel. The problem of salary must be solved.

At the present time there seems to be little problem with promotion structures in the various extension units. On the contrary, due to the rapid turnover in personnel, there has been a great deal of promotion. One is struck with the young ages of key personnel in the various Ministries and state corporations. It is not unusual for a person a year or so out of school to have major administrative responsibilities. There is a problem with this: often personnel advance so quickly through the system that they do not gain enough experience at the lower levels of the organizations, and thus lack a great deal of the practical experience that is so necessary for a good administrator.

b. Working Conditions

Working conditions have been touched on in previous sections of this chapter. There are certainly problems. In the first place, as mentioned before, most of the extension units experience a great deal of difficulty with transportation. This results in a great deal of frustration among extension officers who are not able to perform their work. Unable to travel, they often sit around the offices where little is accomplished. In the second place, the regional offices are not adequate; this affects the performance of personnel. In many of the extension offices, the Baseline Study Team noted a lack of professionalism-Extension workers seemed not to view their work or themselves in a professional way. Professionalism could be fostered by the various organizations at little or no expense. It could serve as a morale booster and improve work efficiency. One way to do this is to given extension workers a larger role in determining the program of the particular Division. Let them understand that it is there program and that they have some voice in its direction.

c. Professional Opportunities

One area where there seems to be some incentives in the various extension units has to do with professional opportunities, more specifically opportunities for further training. This is particularly true in the Ministries. After an employee has served a given period of time, he/she is eligible for further training. This includes training in foreign countries. In this way, many Guyanese agriculturalists are obtaining undergraduate and graduate training in agriculture. When employees take advantage of the opportunity for further training, they are obliged to return to Guyana for a specified period of time and to be employed in the public sector. Unfortunately, Guyana has experience a major problem in recent years getting many of the students to return home after completing their studies overseas. Many of the sponsored students decide to stay abroad where salaries are higher and professional opportunities seem greater. GOG has recently obtained the support of the U.S. Embassy in Georgetown which will now issue only a special visa to a sponsored student that requires him to return to Guyana before another visa can be obtained.

The various extension organizations also hold in-service training programs for their employees. This is particularly true of GUYSUCO which has an elaborate in-service training program. Also, at the present time, there is an in-service training program in the Division of Extension and Education which is being funded as part of the Food Crop Production and Marketing Programme by the IDB.

7. Critical Mass of Trained Personnel in Extension

When assessing the institutional capacity of the several extension units, it is important to consider the level of training of existing staff. Unless the units are staffed with adequately trained personnel, the extension efforts will continue to be severely hampered. Tables 4.3.16-4.3.23 contain summaries of current levels of training for the professional level personnel of five of the extension units.

Table 4.3.16 contains data showing the educational level of the staff of the Division of Extension and Education by positions. A number of the positions are currently being staffed with persons who have less training than typically required by the positions. The PAO for the Division has a BSc. degree. He is the only PAO in the Ministry of Crops and Livestock without a graduate or professional degree. At the time of this study there was one SAO in the Division, and that person has a MSc. (This person has since taken a study leave). The BSc. is considered to be the appropriate level of training for an Agricultural Officer. At the present time, only nine out of thirteen AO's have this level of training. With regard to AFA's, fifteen have Diplomas and twenty-four have Certificates; four have even less training. The preferred level of training for the AFA is the Diploma level. Therefore, most of the present AFA's have training below the desired level. Looking at the Division as a whole, it can be said that with regard to formal training it is functioning at a level far below what is needed. This, coupled with the personnel shortage indicates that the Division is operating far below its needs. While most of the major agricultural organizations in Guyana had serious problems with staffing, it appears that the situation in the Division of Extension and Education may be the worst.

Table 4.3.17 shows the projected personnel needs of the Division by level of training. It was reported that three Masters degree holders were needed, one for the PAO position and two for SAO positions. Ten Bachelor level persons were needed for the positions of AO, and sixty nine Diploma level persons were needed for positions ranging from Agricultural Assistant to AFA. These projected needs are not based on new positions, but rather on existing vacant positions. The conclusion is clearly that within the Division of Extension and Education there is a major problem with regard to the critical mass. The Division lacks both the necessary number of personnel and the personnel it employs presently are not adequately trained for the positions they occupy.

Table 4.3.18 contains data showing the level of training of the current staff in the Division of Veterinary and Livestock Sciences. As would be expected, those occupying veterinarian positions have DVM's-the PAO, Production Manager-Veterinary, Senior Veterinary Officer and the four Veterinary Officers. The Senior Veterinary Officer, the Production Manager-Livestock and the Senior Livestock Officer hold M.S. degrees. The three Livestock Officers have BS degrees. Twenty-four of the Livestock Assistants have Diplomas and five have Certificates. The Poultry Officer and three Artificial Inseminators have training below the Certificate level. The data indicate that most personnel now employed in

Table 4.3.16

EDUCATIONAL LEVEL OF CURRENT MOA EXTENSION STAFF BY POSITION, 1980

Position	Level of Training				
	Masters	Bachelor	Diploma	Certificate	Other
Principal Agricultural Officer		1			
Senior Agricultural Officer	1				
Agricultural Officer		9	4		
Agricultural Field Assistant			15	24	4
TOTAL	1	10	19	24	4

SOURCE: Division of Extension & Education, Ministry of Agriculture

Table 4.3.17

PROJECTED EXTENSION PERSONNEL REQUIREMENTS BY LEVEL OF TRAINING*

Position	Level of Training				
	Masters	Bachelor	Diploma	Certificate	Other
Principal Agricultural Officer	1				
Senior Agricultural Officer	2				
Agricultural Officer		10			
Agricultural Assistant			8		
Senior Agricultural Field Assistant			6		
Agricultural Field Assistant II			20		
Agricultural Field Assistant I			35		
TOTAL	3	10	69		

SOURCE: Division of Extension & Education, Ministry of Agriculture

*It should be noted that the projected personnel requirements do not represent new positions. The eighty-two positions listed are already approved. However, the Division has been unable to fill the positions.

Table 4.3.18

EDUCATIONAL LEVEL OF CURRENT DIVISION OF VETERINARY AND LIVESTOCK SCIENCE EXTENSION STAFF BY POSITION, 1980

Position	DVM	MS	Bachelor	Diploma	Certificate	Other
Principal Agricultural Officer--VLS	1					
Production Manager Veterinary	1					
Production Manager Livestock		1				
Senior Veterinary Officer		1				
Senior Livestock Officer		1				
Veterinary Officers	4					
Livestock Officers			3			
Poultry Officer						1
Senior Livestock Assistant				1		
Livestock Assistant				24	5	
Artificial Inseminator						3
TOTAL	6	3	3	25	5	4

SOURCE: Division of Veterinary & Livestock Sciences, Ministry of Agriculture

this Division have the level of training required by their positions.

With regard to personnel needed for the Division, estimates can be made in terms of existing vacancies. (See Table 4.3.5.) Five additional DVM's are needed for vacant Veterinary Officers positions. Six BS graduates are needed to serve as Livestock Officers and eleven Diploma-level persons are needed for the position of Livestock Assistant. Five persons are needed as Artificial Inseminators-the level of training was not specified by the PAO.

As indicated in the section on personnel levels, the Ministry of Fisheries, which has only recently obtained the status of Ministry, is currently understaffed. Table 4.3.19 shows the educational levels of the Ministry personnel at the level of Fisheries Officer and below, the positions that are involved in extension efforts. The two Fisheries Officers had BSc. training, which is the required level. All of the other personnel were trained at the Certificate level, except for one Fisheries Assistant. Thus, the majority of the Ministry's personnel had training below the necessary level.

Table 4.3.20 shows projected training needs for the Ministry of Fisheries by positions. Staffing levels should expand now that Fisheries is a Ministry. Two Masters are needed for the positions of Senior Fisheries Officer, and seven Bachelors are required for the position of Fisheries Officer. It is projected that seventeen Diploma level persons are needed to staff new Fisheries Field Assistant positions. Finally, twelve Certificate level persons are required for the various Fisheries Assistant positions. As with the Division of Extension and Education, this Ministry is understaffed with undertrained personnel, so that the number of personnel needed with the required levels of training far exceeds the supply.

GAIBANK is also understaffed with qualified personnel. Table 4.3.21 shows level of education of the current extension-type staff. There is at present only one Senior Credit Analyst and that person has a Bachelor's degree. The seventeen Assistant Senior Credit Analysts and the eighteen Credit Analysts have Diplomas. Of course, the telling point about critical mass at GAIBANK is the number of vacancies. Nine Senior Credit Analysts with Bachelor level training are needed (see Table 4.3.22). Eleven Assistant Senior Credit Analysts and twenty Credit Analysts with Diploma level training are required to bring the extension staff up to needed levels.

Table 4.3.23 contains data for the GRB. Currently, one Agronomist and one Field Officer have Bachelor level training. Three Field Supervisors, two Field Officers and one Extension Specialist have Diplomas. One Field Officer and one Extension Specialist were trained at the Certificate level. The remaining extension personnel, i.e. one Field Supervisor, nine Field Officers and one Extension Specialist are trained below the Certificate level. Thus, while the GRB may be relatively well-staffed in terms of numbers, most of its extension personnel are trained below desired levels.

Table 4.3.19

EDUCATIONAL LEVEL OF CURRENT MINISTRY OF FISHERIES EXTENSION-TYPE STAFF BY POSITION, 1981

Position	Bachelor	Diploma	Certificate
Fisheries Officer	2	-	-
Senior Fisheries Assistant	-	-	2
Fisheries Assistant I	-	1	1
Agricultural Field Assistant	-	-	1
TOTAL	2	1	4

SOURCE: Ministry of Fisheries Personnel, February 1981.

Table 4.3.20

PROJECTED FISHERIES PERSONNEL REQUIREMENTS BY LEVEL OF TRAINING

Position	Masters	Bachelor	Diploma	Certificate
Senior Fisheries Officer	2			
Fisheries Officer		7		
Senior Fisheries Assistant				2
Fisheries Assistant II				5
Fisheries Assistant I				5
Agricultural Field Assistant			17	
TOTAL	2	7	17	12

SOURCE: Ministry of Fisheries Personnel, February 1981.

Table 4.3.21

EDUCATIONAL LEVEL OF CREDIT ANALYSTS AT GAIBANK, 1981

Position	Bachelor	Diploma
Senior Credit Analyst	1	
Assistant Credit Analyst		17
Credit Analyst		18
TOTAL	1	35

SOURCE: Interview with Personnel at GAIBANK, January 1981.

Table 4.3.22

PROJECTED GAIBANK EXTENSION-TYPE PERSONNEL REQUIREMENTS BY LEVEL OF TRAINING

Position	Bachelor	Diploma
Senior Credit Analyst	9	
Assistant Senior Credit Analyst		11
Credit Analyst		20
TOTAL	9	31

SOURCE: GAIBANK personnel

Table 4.3.23

EDUCATIONAL LEVEL OF CURRENT GRB EXTENSION STAFF BY POSITION, 1980

Position	Masters	Bachelor	Diploma	Certificate	Other
Head, Agronomist		1			
Field Supervisor			3		1
Field Officer		1	2	1	9
Extension Specialists			1	1	1
TOTAL		2	6	2	11

SOURCE: Guyana Rice Board

In summary, there appears to be a major problem with regard to the critical mass necessary for a viable extension program. Given the fact that it is the extension program that provides the interface between the various agricultural organizations and the farmers, this is a crucial problem which must be addressed. Government has set agricultural priorities that are to a large degree dependent on the participation of farmers in various production schemes. It is the responsibility of the various extension units to obtain this cooperation. If they are not adequately staffed, then the success of the various efforts is in jeopardy. It is imperative for the Government, with the assistance of interested international donors, to staff the various extension units with adequately trained personnel.

8. Summary of Problems with the Extension System

The Baseline Study team found several major problems with the current Extension system in Guyana.

-- The system is highly fragmented. A number of Ministry units and State Corporations support extension activities. Several of these organizations serve the same clientele. Guyana would be better served with an integrated extension service.

-- There is a lack of trained personnel in the various extension units in Guyana. Most extension units have large numbers of vacancies and many positions are filled with persons who have less training than is required by the positions. There is a need to trained additional personnel at all levels as extension workers.

-- Excepting sugar and rice, there are not well-developed technical packages for the major crops produced in Guyana. The extension service, in concert with research units, should develop technical packages for the key commodities produced in Guyana.

-- Salaries pose a major problem in the extension system. There are unjustified differentials in Guyana between employees of the Ministries and the State Corporations. All salaries are low compared to those available outside the country.

-- The lack of adequate transportation hinders the extension program. Agents are unable to service the clientele because they do not have the proper means of transportation.

The major recommendation that the team has for the Extension system is that most of the currently autonomous units should be reorganized into a single administrative unit.

Chapter V

RECOMMENDATIONS

The development of recommendations for this study is the end result of both objective and subjective processes--objective because the recommendations are predicated on the quantitative and qualitative analyses resulting from the Baseline Methodology; and subjective in that it reflects the professional attitudes and biases of the Baseline Study team members and their Guyanese counterparts. These recommendations are based on a brief review of a complex set of agencies and an REE system that has existed for a number of years. Because of the relatively short period of time involved in this study, some of the details of the current system have been omitted. The team had to be quite selective in terms of the institutions it visited and the officials interviewed. This set of recommendations has been developed to address the concerns identified in this study and to improve the REE institutions in Guyana. Finally, to a significant degree, these recommendations partially reflect the collective experience of team members with the REE-system in the United States. It is that system which the team knows best. While the team was cautioned to judge the Guyanese system on its own merits, it was inevitable that the team members would use the US system as a standard of measurement. Nevertheless, it is felt that the recommendations which follow, merit serious consideration from the Government and international donors involved in agricultural development in Guyana. They reflect a systematic attempt to assess the strengths and weaknesses of the REE system in Guyana.

The Baseline Study methodology developed by BIFAD was utilized to conduct the assessment of the REE-system in Guyana. Data were gathered by reviewing documents developed by other study groups, interviewing key officials in the various Ministries and State Corporations and discussing important issues with USAID officials.

The Team was permitted an opportunity to discuss specific recommendations, problems and solutions during several meetings with representatives from the Ministry of Agriculture, the Ministry of Education, State Corporations and USAID. Although there was no final consensus of opinion, these discussions proved extremely useful. While the recommendations reflect major inputs from key organizations in the agricultural sector, the recommendations, in the final analysis, were the responsibility of the study team.

This is to say, the recommendations do not constitute official positions of either the Government of Guyana or USAID. The Team attempted to conduct an objective analysis of the current REE-system and to propose changes that would provide remedies for major deficiencies in the system. It is hoped that they will be given serious consideration, singly and collectively, by appropriate GOG officials and international donors. It is the firm conviction of the Baseline Study team that a

strong REE-system is a necessary condition for meaningful agricultural development.

A. Summary of Key Findings

The recommendations must be understood in the context of the present situation in Guyana. This situation was discussed in detail in previous sections of the report. However, at this point, it would be useful to list several of the key findings, findings which serve as the basis for the recommendations.

1. While the national agricultural goal of self-sufficiency in food and fiber and the accompanying production targets for key commodities have been precisely stated and restated in national plans and elsewhere, there has been no systematic attempt to use the REE-system to address this goal and the accompanying production targets. The REE-system has not produced the necessary level of training, research and extension. The setting of a national production target for cotton, corn and coconuts has not been accompanied by the training of more personnel in these crops, the generating of research needed to promote increased production, or the development of essential technical packages to be applied at the farm level.

2. The REE-system is highly fragmented. This is especially true for the research and extension components. Far too many units are serving the same clientele. This is not an efficient use of Guyana's limited resources.

3. There is a lack of trained personnel in each segment of the REE-system.

4. Each segment of the REE-system suffers from a lack of adequate financial support. This lack of support is manifested in low salaries, a lack of sufficient personnel, a lack of facilities and supplies.

5. While lacking insufficient numbers, each segment of the REE-system has well-trained, well-qualified and highly motivated personnel. Unfortunately, these persons are few and typically are assigned to administrative positions, rather than to actual teaching, research or extension. The system lacks depth in personnel. Qualified personnel tend to be overworked, spread too thinly among the multitude of jobs that require their professional training and judgement.

6. The current system is in flux. This is true for two major reasons. The first is, that since independence, the organizations which contribute to the REE-system have been constantly changing. Ministries have been changed and reorganized. State Corporations have come into existence and have added and dropped

enterprises. New educational programs have been added. A second reason for the flux is that given the lack of trained personnel, strong individuals within the REE-system have been able to alter radically the direction of the system, usually in terms of their special interests. Unfortunately, personnel has not been stable, and therefore, program emphases have often changed along with personnel.

7. The existing system emerged out of Guyana's colonial past, and institutions often reflect both characteristics and goals of that past. Since independence, the REE-system has been undergoing changes which make it more responsive to the agricultural sector of an independent Guyana. Nevertheless, there are still changes needed in order to make the REE-system less a product of its colonial past and more of a tool to be used in the promotion of Guyana's economic growth.

Guyanese officials and professionals, during the course of the Baseline Study, proved quite knowledgeable about the current condition of the REE-system and its historical context. There was a great deal of agreement about these matters. This should provide a basis for formulating solutions.

B. Assumptions

The recommendations which follow are predicated on a set of assumptions about the current political and economic situation in Guyana and about the support from international donors and institutions. The major assumptions are:

1. Given the current economic situation in Guyana, a shortage of foreign exchange will continue for the foreseeable future. This state of affairs could be altered, if commercial quantities of oil and/or other deposits are discovered in Guyana.

2. The Guyanese goals of self-sufficiency in food and fiber will remain central to the government's economic program and that these goals will be reflected in both production targets for given commodities and support of the REE-system. Currently, agriculture has a high priority in Guyana and therefore agricultural institutions, including REE, have a high priority for development. Should development priorities change, the importance of the REE institutions might diminish.

3. International donors will continue to support development projects in Guyana. The current development efforts in Guyana are, to a large degree, dependent on external funding. Should this not be forthcoming in the future, Guyana would have great difficulty funding projects to improve the REE-system.

C. Summary of Recommendations

1. General Recommendations

General Recommendation 1

That the current REE structure be reorganized in order to develop an integrated and cooperative REE-system utilizing resources available to the Ministry of Agriculture, Ministry of Education, State Corporations and others as appropriate.

Since independence in 1966, there have been several major reorganizations of the agricultural sector designed to develop programs and strategies essential for the development of a new nation, and to better meet the needs of its citizens. Developments, thus far, have been highly fragmented with much duplication of efforts in the separate REE components developed by MOA, MOE, and State Corporations. Lines of authority permit cooperation, but only on an advisory or informal basis. There is currently no overall coordination of the REE-system. As new research education and extension units have been created, they have tended to duplicate existing programs and to function independently of them. There tends to be a duplication of uncoordinated programs.

The strategy should be to merge the individual elements of each component of the REE-system into a single functioning unit and to provide an overall structure to assure proper articulation between the three components. This is to say that the fragmented units of research and extension should be merged into single units, and that agricultural research, extension and education (at the tertiary level) should be put under the administration of a single unit.

General Recommendation 2

That a competitive salary structure and personnel policies be developed to recruit, maintain and reward competent personnel in the REE programs.

Turnover of personnel has been and is detrimental to on-going REE programs. This, coupled with the current shortage of trained manpower, is a major constraint to REE program development. The causes of rapid turnover are differential salary scales within the country, non-competitive scales with those in other Caribbean organizations and internationally, and the lack of proper incentives to reward outstanding performance.

The strategy for addressing these problems should be:

1. Equalize the salaries between REE personnel in the state corporations and MOA. The only realistic way to do this is to remove the REE-system from the Public Service domain. The establishment of an authority similar to a state corporation, to conduct

agricultural research, extension and education should allow the payment of higher salaries for trained professionals. There would no longer be the differential between State Corporations and the regular Government employees.

2. Develop additional perquisites such as tax incentives which would make government employment more attractive.

General Recommendation 3

That a transportation infrastructure be developed to permit REE staff to travel, as appropriate, in carrying out duties and responsibilities.

Transportation problems have been a major constraint to research and extension personnel as well as faculty and students located at UG and GSA. Researchers described situations where projects have failed and/or data were not collected, because they simply did not have the necessary transportation to travel to research project locations. Extension personnel are unable to make routine visits with farmers because transportation is frequently not available or accessible. Likewise, one of the problems identified in establishing and expanding joint UG/GSA programs is the lack of transportation between these two institutions.

One approach to solving the problem is to establish several government vehicle pools with a modest number of trucks and passenger vehicles for staff travel, and buses for faculty and student travel. In addition, a procedure for submitting travel requests would permit persons going to the same location to share a vehicle. To support the motor pools, it is further suggested that mechanics be trained to do routine maintenance and that an adequate spare-parts inventory be maintained to permit timely repair of vehicles.

2. Research Recommendations

Research Recommendation 1

Develop a comprehensive research plan designed to support effectively national and regional agriculture priorities of increasing production and improvement in the standard of living of the rural population.

Since independence, GOG has developed national agricultural priorities with an emphasis on key commodities, such as cotton, grain, edible oil and milk. State Corporations have assumed the leadership in research efforts for sugar cane and rice production. There is a need to establish research groups for other commodities identified as important to Guyana.

The Central Agricultural Station, Mon Repos, has major research responsibilities for crops, plant protection, soils, agronomy and livestock. The major research facilities, equipment, and research staff support this one station. On the other hand, the sub-stations in other parts of the country have little in the way of staff, facilities and equipment. Therefore, almost all important research conducted by MOA is done at Mon Repos. Given the Government's goal of agricultural development of the hinterland, it is important to upgrade the research program in these areas. Some research stations and facilities already exist in these areas. These should be fully staffed and there should be comprehensive research programs developed at each of them. Additional sites should be developed and staffed. The goal should be to have a research station in each area that has significant potential for agricultural development.

A strategy for supporting national and regional research priorities would include: 1) developing research facilities to address key commodity and production problems; 2) train additional Guyanese to staff these facilities; 3) provide on a continuous basis, the supplies and materials needed to support uninterrupted research; 4) staff regional research centers with adequately trained research and support staff; 5) further encourage interaction with scientists at International Research Centers, especially those working with Guyana.

Research Recommendation 2

Appropriate research should be conducted and reported prior to implementation of major agricultural production schemes.

Several major and costly agricultural production schemes have been implemented without full knowledge of production requirements, land use capabilities and equipment needs. Situations were described where major land holdings were acquired, facilities constructed, equipment purchased and crops planted without previous experience and no research data for conditions similar to in Guyana. Examples are the Kimbia cotton project initiated by GNS and the Ituni corn scheme initiated by CARICOM. Large acreage was planted without knowledge of the expected yields and economic benefit to Guyana.

In developing future research programs, it is important to consider national and regional priorities and previous research project accomplishments.

1. A thorough review should be made of all previous (discontinued) and current research efforts to determine which should be reinitiated and/or continued in addressing research priorities.

2. New projects should be critically reviewed to establish their technical and economic viability.

3. Large scale schemes should not be implemented until proper research is done and the scheme judged feasible.

3. Extension Recommendations

Extension Recommendation 1

That the Extension Service be integrated into a single functioning unit. The extension service should be organized to provide general extension services at the farm level with specialized commodity specialists available from national and/or regional centers.

Extension programs in Guyana are too specialized and fragmented in view of against the scarce staff and financial resources available for delivering technical services to farmers. Several divisions within the Ministry of Agriculture and the State Corporations are involved in providing technical information to producers. The GRB, GUYSUCO, MOA-Division of Extension and Education, Division of Veterinary and Livestock, GAIBANK and MMA-ADA are involved in the delivery of information on production, loans, and marketing to farmers and farmer groups. Programs of these units serve the same farmer groups because most farmers in Guyana have only a few acres and engage in mixed farming. Therefore, it seems appropriate to have a single extension program to serve them.

Graduates of both the diploma and certificate programs at GSA are employed as extension agents in all the agencies mentioned above. While the extension agents may be concerned with different commodities and utilize different methodologies, most agents receive similar training at GSA. The differences in the various extension programs are due to the particular organization, its clientele and crops.

If the extension activities were integrated into a single functioning unit, more efficient use would be made of limited personnel resources in the delivery of technology to a greater number of farmers. In addition, much of the duplication that currently exists would be eliminated. An interagency task force should be created to define a mechanism for the integration of the extension system.

Ideally, the extension component of the REE-system would be restructured, so that at the national, regional and local levels, there would be a single, unified program. A given farmer would be presented with one comprehensive extension program, rather than several fragmented ones.

Currently, extension efforts are handled in different ways by several Ministry divisions, as well as the State Corporations. This fragmented approach produces the desired benefits in several situations, however, services are provided to a relatively small segment of the farming population. Furthermore, it is not unusual for a given small farmer to be serviced by several extension organizations (crops, rice and livestock). Separate extension facilities, staff, transportation networks and support infrastructures are maintained at a significant cost.

To utilize current manpower in the delivery of technical services, Diploma and Certificate trained personnel should be permitted to work at the farm level as generalists to handle the routine requests and contacts. Staff trained at the BS level would provide specialized technical information from regional and national centers when a request for information is received from extension generalists and/or producers. These individuals would also be responsible for keeping farm level staff knowledgeable of new information and technologies through visits, letters, and memoranda. Staff trained at the MS level would serve in dual capacity at national and regional centers. They would participate in carrying out research and serve as a source of specialized information. Demonstrations, workshops, and field days would also be arranged to discuss and present new findings and results from other research centers that might improve national and regional production of commodities.

This strategy would be implemented by identifying qualified individuals to fill existing vacancies in the following fashion:

1. Develop staffing needs at national, regional and local centers.

2. Fill positions by reassigning extension staff currently associated with the Ministry of Agriculture, Ministry of Education, and State Corporations.

3. Identify critical needs and ways to meet these over the short term by:

   a. Retraining existing staff;

   b. Identifying long and short term programs to train new staff;

   c. Establish exchange programs with national and international institutions.

4. Provide in-service training programs for extension staff to improve techniques for working with farmers.

5. Establish relationships with other institutions to train personnel to be employed in extension positions. Successful foreign extensions could be used for this purpose. The training should be done in Guyana.

6. Establish a Coordinating Committee made up of research and extension staff to determine (1) ways of planning research programs which address immediate production needs and (2) the delivery of results to the farm level.

Extension Recommendation 2

That the MOA, through its extension program, in concert with the research divisions, develop technical packages to improve production of key commodities at the producer level (e.g. coconut, edible oils, grain and livestock.)

Except for the major export crops (sugar and rice) there is a dirth of information available to producers to aid them in improving production. Although many of these commodities are included in the national development strategy, maximum farm level recommendations and technical packages have not been available as needed.

Information specialists should be employed by the extension service to work with researchers and extension commodity specialists in developing technical packages for improving production at the farm level. Information should be available in the form of printed materials and slide-tape presentations for use by extension leaders. These might contain information on selection of farm enterprises by region, cultural requirements, recommended varieties, fertilizer levels and planting schedules, as well as strategies for commodity marketing.

GRB and GUYSUCO have developed technical packages for use by extension staff in their work with producers. The MOA and its extension program could benefit from similar materials.

To improve the delivery of information, opportunities should be provided for information specialists to visit institutions involved in similar activities especially International Research Centers and eligible U.S. Title XII institutions. Training should focus on delivery of information at the farm level to small farmers.

Extension Recommendation 3

That the extension units establish appropriate linkages with key credit and marketing organizations which have impact on producers at the farm level.

Currently, extension, credit and marketing organizations function largely independent of each other. Therefore, the advice given the farmers by the extension agent is often unrealistic in terms of credit availability and marketing strategies. There is a need to coordinate these functions within the extension system.

To insure success at the farm level, the following are necessary: 1) producer interest; 2) available technology; 3) operating capital; and 4) markets for products. Technical packages should be prepared for producers containing information necessary for enterprise analysis, farm management, and marketing strategy, coupled required technical information. The Food Crop Production and Marketing Programme is a move in this direction. This effort should be carefully monitored and expanded when appropriate.

Extension Recommendation 4

That the extension program focus on national and regional agricultural priorities.

There are numerous examples of national agricultural priorities that are established independently of the extension program. For example, production goals have been set for milk, corn and black-eye peas, without the development of corresponding extension efforts to promote and support these crops. Consequently, there has been only limited participation by private producers.

Once national production goals have been established and the necessary research completed, appropriate technical packages and extension methodologies should be developed for each commodity for use and promotion by extension service staff.

4. Education Recommendations

Education Recommendation 1

Examine and, when appropriate, redefine the role of agricultural institutions (post-secondary) in providing trained manpower for Guyana (UG, GSA, BAI).

The faculty and supporting staff associated with UG and GSA are not adequate to meet the demands for trained agricultural workers in Guyana. Although GSA was established to train sub-professionals in agriculture, many students have continued their studies for the BSc degree. As a result of this, the number of pre-professional staff trained at the Diploma and Certificate levels has been less than adequate and technical assistance at the farm level has suffered in Guyana.

Although the recent program at UG was designed to train BS and MS level candidates, it has depended heavily on the GSA faculty to provide training for its students. This was necessary because the UG has never had the faculty, facilities and support to establish its program.

It is essential that Guyana examine the purpose of these institutions to supply in-country training of technical manpower at the Diploma, Certificate and Degree levels. This examination should be at the highest level. Jurisdiction and domain should be clearly defined for each institution. Stated goals should correspond with actual practices.

Strategies must be developed to train Guyanese manpower to address the national and regional priorities:

1. Specific roles must be defined for UG and GSA to eliminate program duplication. GSA should return to its function of training junior-level agricultural officers. Students interested in university training should be admitted directly to UG/FA rather than doing work at GSA.

2. Prospective students must be informed of the purpose of training programs, opportunities for further training and employment expectations within the public and private sector.

3. Strategies must be developed for student scholarship support for training outside of Guyana. A Committee composed of representatives from the Ministry of Education, Public Service Ministry, Ministry of Agriculture, State Corporations and UG faculty should develop guidelines for selecting scholarship recipients based on national priorities.

4. The role that educational institutions will play in assisting extension efforts should be defined, especially in supporting extension workshops, short courses and in-service training activities.

5. Utilize technical agriculture staff associated with donor agencies to teach courses within their area(s) of specialization.

Education Recommendation 2

Improve facilities associated with agricultural education institutions to better serve future needs of Guyana.

Current facilities, while adequate for the GSA Diploma and Certificate programs, are not sufficient for baccalaureate training. The current facilities are not adequate for the increased number of students. Furthermore, the laboratories, library and other support facilities are not adequate for future training in agriculture. The lack of facilities at UG/FA severely limits its ability to provide quality agricultural education.

The following should be done:

1. Existing facilities should be upgraded to permit maximum utilization. At the UG campus, several buildings are not completed. These could be completed with the supporting infrastructure to better meet current needs. Laboratory equipment, student desks and other support would provide a significant improvement in program offerings.

2. A strong commitment should be made to upgrade the library to better serve Education, Research and Extension:

   a) increase technical holdings on agriculture;

   b) improve information cataloging and retrieving systems;

   c) Agreements should be established with other organizations located in Guyana to use technical books, journals, and maga-

zines on a loan basis (USAID, IDB, and other agencies maintain technical libraries that might be utilized).

Education Recommendation 3

Promote graduate study programs that permit students to conduct thesis research in Guyana or on a project of importance to Guyanese agriculture.

Many students who receive training abroad conduct research on topics that are not relevant to Guyanese agriculture. Short and long-term strategies should be developed simultaneously to remedy this situation. One short-term strategy is for the Government to support thesis research on high priority commodities.

1. Identify educational programs that permit students to develop thesis research programs important to Guyana.

   a) Thesis research carried out in Guyana to satisfy degree requirements;

   b) Thesis research carried out in another country with direct benefit to Guyana. Topics could be commodity or procedure oriented.

   This would require the careful placement of students in graduate programs. Cooperative programs with US Title XII institutions in cooperation with International Research Centers, UG, State Corporations and other institutions addressing similar concerns should be considered.

2. Identify sabbatical and short term study leave for Guyanese research scientists and/or university research faculty who work with MS students to expose them to new techniques.

Education Recommendation 4

Provide professional development opportunities whereby Guyanese might be exposed to new methods of addressing problems that limit Guyanese agricultural production.

Senior faculty are not provided the same opportunities for professional development as research scientists. Such opportunities are important, if new and relevant ideas are to be incorporated into the agricultural curricula. It is important for GSA and UG faculty to attend professional meetings and workshops in order for them to be exposed to new instructional methodologies, and resource materials for use in improving courses. Appropriate programs can be arranged for Guyanese faculty at US Title XII institutions, international research centers, and Caribbean Institutions. Advertisements might also be published in international journals for faculty interested in spending a sabbatical in Guyana to serve in a teaching or research capacity.

D. Prioritized and Phased Program for Strengthening the REE-System

Recognizing that the current REE-system is complex and that changes in the institutions require time, it seems prudent to recommend changes in the system in terms of phases--short-term, medium-term and long-term. The reason for this is two-fold: the first is that some problems have greater priority and should be addressed first. The second is that some changes require more time and are predicated on other changes having occurred. Below is a suggested program designed to upgrade the REE-system.

1. Phase I (1-3 years)

Phase I of the program covers years 1 to 3 and includes improvements that can be implemented in the near future. They require only small initial financial investments or personnel commitments. They are meant to initiate the process of institutional change.

a. The UG/FA should be strengthened and made into an operational program. A joint committee of key personnel from the Guyana School of Agriculture and the University of Guyana-Faculty of Agriculture should be established to examine the relationship of the new UG/FA program to the established GSA program. Resolutions of existing problems should be achieved during the 3-year period. There are:

1) Relationship of the curriculum at GSA with the curriculum at UG/FA. How much of the existing curriculum at GSA can be utilized by UG/FA? What modifications must be made in GSA courses to meet university standards? Will the UG/FA students take the same classes as the diploma and certificate students at GSA?

2) A determination of the future role of the diploma and certificate courses at GSA. If the GSA and the UG/FA continue to be integrated, to what extent will GSA maintain its original function of training junior-level agricultural officers and practitioners?

3) If there continues to be integration of the GSA and UG/FA programs, can and should the governance of the institutions remain separate?

4) The physical location of UG/FA; should it be housed at the UG campus at Turkeyen or on the campus (or nearby) of GSA at Mon Repos? When considering this issue the following should be taken into account.

a) Transportation between the two campuses: So long as the programs are integrated, there will be a need to transport students. If UG/FA is located at Mon Repos, the students must be transported to UG for basic science and

general courses and vice-versa. Currently, the road from the highway to Mon Repos is extremely bad and UG/FA does not have adequate means of transport.

b) The duplication of laboratories and laboratory equipment: If the schools are located near one another, they can share facilities.

c) School Farm for UG/FA students: The housing of the UG/FA at Turkeyen would necessitate the establishment of a new farm. On the other hand, if it is located at Mon Repos, would the farm out there be adequate for UG/FA purposes? What are the economic factors?

5) The adequacy of the faculty and staff at GSA to provide university level training: Will the integration of the UG/FA and GSA programs necessitate additional training of GSA personnel to qualify them to teach at the university level? If so, what additional training will be needed?

6) The role of UG/FA faculty in teaching at GSA; will the UG/FA faculty members be involved in teaching courses at GSA, either for UG/FA students or regular GSA students?

7) The role of UG/FA faculty in other REE activities, such as extension and/or research; will facilities and faculty interest and capabilities permit such an involvement?

These and other issues must be resolved in the near future. The current situation seems ill-defined. As UG/FA seeks to establish its program and obtain funding, it is essential that its relationship with GSA be explicitly stated. Likewise, as the UG/FA is further developed, it is important for GSA to reassess its role in the Guyanese education system.

b. Given the need for diploma-level personnel in the MOA, MOE and State Corporations, GSA should expand its program to accomodate increased numbers of students. In addition, it should examine its curriculum to determine whether or not it provides the most relevant training for the varied opportunities that are available to students after graduation. Guyana and Guyanese agriculture has undergone important changes since GSA was established eighteen years ago. This assessment should include an analysis of: a) the types of jobs that the graduates are taking and the duties they are asked to perform; b) the educational careers of students after they leave GSA and are they obtaining additional education; and c) the relationship of the curriculum to national agricultural priorities. In the past, GSA has been highly successful in producing a good junior level agriculturalist. The GSA graduates have also done well in government service, state corporations, advanced education and other enterprises. To assure that the GSA program continues to address national

needs and produce graduates who are well prepared to perform in the agricultural sector, the following strategy could be conducted:

1) A determination of the number and types of junior-level agriculturalists that MOA, MOE and the State Corporations will need over the next few years and the type of training needed. (To some extent, this is specified in this report.)

2) Review the curriculum with the help of professional level personnel from MOA, MOE and State Corporations, with the purpose of revising it to be more responsive to current needs.

3) An examination of the feasibility of establishing a cooperative education type of an arrangement with MOA, MOE and State Corporations to provide additional practical training experience to the students and to assure that classroom training is related to the work situation.

4) Determine the needs of GSA for additional faculty, facilities and funding required to accomodate the additional students.

c. Given that the current REE-system is staffed, in part, with persons who have less than required levels of training, a program short courses and in-service training courses should be instituted. These should be directed towards MOE and MOA personnel, as well as state corporation personnel. Courses would be most relevant for agricultural teachers in secondary schools, extension and livestock assistants in the MOA and selected research personnel. Several points should be made about the training courses:

1) As much as possible, they should be in-country rather than abroad for the following reasons:

a) The training is more likely to be appropriate to Guyanese agriculture, if done in-country. Often students who are sent abroad receive training which is not applicable to the Guyanese situation. Given the shortterm nature of the training, it is important that all aspects of the courses be targeted to Guyanese agriculture.

b) In-country training is more economical: more students can be trained for the same amount of money. Travel cost would be eliminated. Even if a foreign expert is

brought into the country to conduct a course, this would be more cost effective than sending students abroad.

c) There can be better follow-up of training that is done incountry. At appropriate times after the training, the participants can be assembled for follow-up sessions.

2) Whenever possible, Guyanese professionals should be involved in the preparation and teaching of courses. While it may be desirable to utilize professionals from abroad, utilizing Guyanese professionals on the same team would provide an opportunity for them to work with their peers from other countries. This will also help to institutionalize in-service training in Guyana.

3) Topics for training courses should be prioritized in terms of the needs of the agricultural sector. Although the list is not complete, the Baseline Study Team noted a number of training needs; i.e. farm mechanization, extension methodology, farm management, technical packages for key crops, livestock and crop management, report writing, research design and data collection techniques.

d. It is important to address the problem of public service salary structure in general and the salary differentials in Guyana, in particular. The REE-system suffers from a high attrition rate caused by persons leaving the system entirely or transferring within the system for higher salaries. Guyanese agriculturalists have in recent years, and in in increasing numbers, sought employment outside of Guyana because salaries were substantially higher than they would obtain at home. Within the country, there are modest, but significant, differences in salary and other economic benefits between the various Ministries and the State Corporations. This has resulted in a great deal of horizontal mobility within Guyana; persons move to similar jobs within Guyana. Both of these phenomena have severely weakened the REE system. It is, therefore, important that the issue be addressed and a solution be found. An interagency committee should be established to equalize salaries within the system and to develop financial incentives necessary to keep qualified people in the system. If it is not possible to actually raise salaries, then perhaps GOG might be able to make Public Service more attractive by providing tax incentives and other perquisites. A solution would be to move the REE-system outside of the Public Service jurisdiction and give it a status similar to that of a state corporation. This was done with the MMA-ADA and might well work for the entire REE-system. Using this approach, the salary problem in MOA could be solved without having to deal with the many and complex problems of revising the whole Public Service. Secondly, it would serve to separate extension and research functions the many others now found in MOA. Currently, research and extension complete for time and resources with the

other functions of the various agencies, such as the production and distribution of agricultural inputs and enforcing health and other regulations. Finally, this solution is a proven one in Guyana. The establishment of state corporations has been the standard method used to remove various parts of the agricultural system from the Public Service domain.

e. The extension effort among small farmers should be strengthened by integrating the separate units of the various Ministries, Divisions and State Corporations organically and/or functionally. The reasons for this are the following:

1) There is a shortage of trained personnel in the country, and with little chance that the situation will improve over the next few years. Most organizations with extension units currently have numerous vacancies, some as high as 50 percent. Furthermore, many extension positions are staffed with persons with less than the required amount of training.

2) Regardless of the organization, most extension personnel have the same type of training. Most are graduates of the diploma or certificate course at GSA. In terms of training, most extension personnel are interchangeable between organizations.

3) Most of the farmers served by the various extension services engage in mixed, rather than specialized farming. For example, the rice or sugar cane farmer on the coast most likely will grow vegetables or other crops and raise livestock. It may be that the typical farmer might best be served by a single extension effort in the form of a generalist or a team that systematically combine its recommendations, so that the farmer receives a comprehensive plan for the use of his land. The current system, which is highly fragmented and commodity oriented, results in many extension agents representing different organizations offering the farmers piecemeal advice. Extension generalists would, of course, have back-up support provided by a centralized specialist staff.

4) The extension programs of the various organizations appear to be underfunded, and given the current financial situation in Guyana, there is little prospect that this will change in the near future. The lack of adequate funding is reflected in the lack of equipment, transportation and other common deficiencies found in the various extension systems. An integrated system should prove more cost effective and should result in better working conditions for extension workers and better service to agricultural producers.

The integration of the various extension services will not be an easy task because at the present time each system has its own set of concerns. It is expected that each organization will be protective of its interests and methodology. However, an integrated program should not be weaker, in whole or in part, than any of the existing components. That is to say, extension efforts in the area of rice or livestock production should not be weaker under an integrated system than in a separate system devoted exclusively to rice or livestock production. In fact, the purpose of of creating an integrated system is to strengthen extension efforts, not weaken them, and to utilize resources more effectively.

Since the integration of extension units into a single organization represents major changes within funding and personnel, it should be undertaken a deliberate and studied fashion. When designing a new integrated extension program, the following items should be considered:

1) The various extension units should be examined as to clientele, crops and methodologies. If particular units lack sufficient commonality with others, then it makes little sense to integrate them. For example, it is probably true that the extension units of Fisheries and Forestry Ministries serve different clientele and utilize different methodologies than the other units; they certainly are concerned with different crops. If this is the case, then it would not prove beneficial to integrate them with the other units. For most extension units, there is a high degree of commonality. This examination should be made by persons from the various extension organizations, as well as professionals who can represent the interests of the agricultural sector at large.

2) The final integrated organization might well take one of three forms:

   a) A totally integrated system which is administratively under a single division.

   b) A functionally integrated system in which individual units maintain a high degree of autonomy, but participate in a single extension program with the roles of each unit being well-defined.

   c) A mixed system which could have several units merged administratively and other units maintaining autonomy, but participating in a common program.

3) The resulting system should be flexible in design and able to reflect existing agricultural conditions in the country. In the areas where farming is mixed, the farmlevel extension

agents should be generalists. However, there are specific production areas that are largely concerned with a single crop. In these areas, a specialist might be utilized.

4) With an integrated system utilizing generalists at the farm level, there is a need to maintain specialists at a higher level in the system. The specialists would backstop the generalists and provide the ground consultations when necessary.

5) Technical packages that have been developed by the specialists and researchers must be available for the extension agent in the field.

6) When developing the integrated extension structure, the primary concern should be a strengthened extension service and not just economic savings. The redesigning of the system must be done carefully and deliberately. A redesign of program must involve a redesign of the administrative structure to insure that the integrated system provides a strengthened extension service and not just an economic savings.

f. With regards to research, the short-term strategy should be (1)to develop mechanisms for coordinating research efforts and (2)to develop a national research program tied to national agricultural goals and priorities. The current system is fragmented. The Agricultural Committee of the National Science Research Council is a step in the right direction. However, it appears to lack both funding and jurisdiction. What is needed is an organization that can set research priorities, assign research responsibilities, and assess research results. Integration of the various research components into a single unit should be explored.

g. Stronger linkages should be developed between the components of the REE-system. Many of the current linkages that exist between research, education and extension are informal and infrequent. The linkages need to be institutionalized, so that there is a formal articulation between the three components of the system. This could be accomplished by (1) the development of a single structure of which research, extension, and education are elements; or (2)the development of formal links between the components of the system. Initially, a joint committee with representatives from the various REE components should be established and charged with the responsibility of developing a mechanism for assuring a unified REE-system. One possible form for the integration of the REE-system would be the establishment of a National Agricultural Research, Education and Extension Service under the MOA, but with its own Board of Directors and outside of the Public Service.

h. As GOG develops its specific program for the development of the REE-system, opportunities for participation by international donors and foreign agricultural specialists should be identified. Given the current financial situation in Guyana and the lack of sufficient numbers of trained personnel, it is important to seek collaboration from major international donors, foreign universities and research centers in order to bring the necessary resources to bear on the current problems. In so doing, GOG should first devise its program and then look for an international sponsor. It should not adopt strategies and/or programs simply because some organization is interested in them and will supply funding.

2. PHASE II (3-6 years)

The second phase of the program to improve the REE-system should concentrate on aspects of the system which require time to change, i.e. the upgrading of staff, staff expansion, the development of extension packages and the establishment of commodity based research groups. The recommended strategy for Phase II is as follows:

a. Across the board, the skills of existing REE personnel should be upgraded. Throughout the system, the ranks of academically qualified personnel are thin. There is a need to increase B.Sc., MS, and Ph.D level personnel. Persons from within the system who have demonstrated their ability and commitment should be supported for further study. At the baccalaureate level this might well be done in-country. At the graduate level, foreign institutions should be selected carefully, so as to insure that the training provided meshes with the needs of Guyana. If possible, thesis work should be done in Guyana on Guyanese problems.

b. The number of professionaly trained personnel in the REE-system should be increased during Phase II. The analysis offered convincing evidence that the major REE institutions lack a necessary critical mass. Part of this deficiency can be remedied by upgrading the training of existing personnel. However, there is also a need to increase the number of personnel employed in the system. This, of course, will necessitate the support of additional training.

c. As the system produces trained personnel, research groups should be organized in terms of key commodities. As GOG has determined priorities with regard to certain agricultural commodities, i.e. cotton, grain, soybeans, edible oil, etc., if Guyana wants to be successful, it must devote serious long-term research efforts to them. This has successfully been done with sugar and rice, each of which has a research group devoted to the study of that particular crop.

d. Replace foreign personnel at UG/FA with Guyanese who have completed their graduate training. Given the lack of qualified Guyanese personnel to teach agricultural science at the university level, foreign scholars would be necessary in the early stages of the program. During Phase II, however, there should be a phasing out of foreign personnel.

e. In concert with research groups and CSA-UG/FA personnel, extension units should develcp commodity specific technical packages that can be readily adopted by the farmers. Such a package exists for sugar. To a lesser degree, there is one for rice. There is an urgent need for such packages for other crops.

3. PHASE III (7-10 years)

The third and final phase of the program to develop the capacity of the REE should involve: 1) a completion of programs listed in previous phases; 2) an evaluation of the system at the completion of Phase II; and 3) adjustments in the system based on the findings of the evaluation and the current demands of the agricultural sector. Specific activities recommended for the third phase are:

a. A continuation of professional training for staff at all levels of the system. Given the severe shortage of trained personnel in the present system, it is highly unlikely that the need for additional trained personnel will have satisfied by the end of year six. It is important to monitor the situation carefully to make certain that not only adequate numbers of professionals are being trained, but that they are being trained both in the right field and at the right level. Increasingly, the necessary training should be done in Guyana. Enrollment at UG/FA and GSA should be adjusted in terms of the number of needed personnel at any given time.

b. As the capacity of the REE-system expands, there will be a need for additional funding. Growth in the budget should be directly tied to enhanced capacity of the system. The Baseline Study Team found that due to a lack of trained personnel, the current system would experience difficulty in effectively utilizing additional funds. However, as additional personnel is added, the REE-system should be able to expand its programs and thus require higher levels of funding.

c. As the REE-system develops, there is a need to do periodic evaluations to determine if the adopted strategies for improvement are actually working. The only reason for modifying the system is to improve it, to remediate existing problems. Evaluation is necessary to determine whether or not the improvements have actually occurred and whether or not the changes introduced have created new and unanticipated problems. The evaluations should

be as quantitative as possible and results should be compared to data from the Baseline Study.

d. Based on the outcome of the evaluation, a new program for the improvement of the REE-system should be formulated. The evaluation should point to weaknesses or faults within the REE-system and suggest modifications. There is a need for the REE-system to begin long-term planning. Currently, most units submit yearly plans. The system should work in terms of at least a five-year rotating plan. It should be yearly.

e. Based on the new program for the development of the REE-system, the role of international donors should be defined. Opportunities for the continued participation of international donors, as well as professionals from foreign universities and research organizations, to continue to participate in the strengthening of the REE-system in Guyana should be identified.

LIST OF APPENDICES

APPENDIX A

UNIVERSITY OF GUYANA

Persons Contacted:

1. Name _____

   Title _____

2. Name _____

   Title _____

3. Name _____

   Title _____

4. Name _____

   Title _____

5. Name _____

   Title _____

6. Name _____

   Title _____

7. Name _____

   Title _____

8. Name _____

   Title _____

9. Name _____

   Title _____

ORGANIZATION CHART - UNIVERSITY OF GUYANA

Brief history of the School
(When was the school founded? What have been the major stages in its development? Other relevant information).

Description of the present programm
(Number of students? degree programms & degrees offered? facilities? faculty size? admission standards? gouvernance?)

CURRICULUM

UNIVERSITY OF GUYANA (UG)
Faculty of Agriculture

General description of the Course Offerings at UG:

Detailed listings of the Course Offerings in the FACULTY OF AGRICULTURE:

Listing of the Degree Requirements in the FACULTY OF AGRICULTURE:

Brief description of the development of the FACULTY OF AGRICULTURE
(When was the programm started? Major developments? Other Information).

Description of the present Programm in the FACULTY OF AGRICULTURE
(Number of students? Number of teachers? Facilities, etc.?)

RESOURCE ALLOCATION - University of Guyana (UG)

BUDGET FOR UG

Breakdowns by categories if possible - Salaries Supplies, etc.	1976-77		1977-78		1978-79		1979-80		1980-81	
	Current	Capital	Current	Capital	Current	Capital	Current	Capital	Current	Capita
TOTAL										

FACILITIES (UG)

Description and Rating (use 5-point scale: 0=non-existent, 1=excellent, 3=adequate, 5=totally inadequate).

NOTE: Both judge them yourself and have the respondents judge them. Indicate what is needed, where the problems are. Give numbers where possible, e.g. 22 classrooms, 1 dining hall, etc.

	Description	Number	Rating	Needs
a) Classrooms				
b) Offices				
c) Conference rooms				
d) Auditorium (Assembly Hall)				
e) Laboratories				
f) Store rooms				

FACILITIES (UG) cont.

	Description	Number	Rating	Needs
g) Equipment storage sheds				
h) Farm shop				
i) Other farm buildings				
j) Library				
k) Residence halls				
l) Dining halls				
m) Faculty housing				
n) Sport facilities				

BUDGET FOR UG/FACULTY OF AGRICULTURE

Breakdown by categories if possible - Salaries, Supplies, etc.	1976-77		1977-78		1978-79		1979-80		1980-81	
	Current	Capital	Current	Capital	Current	Capital	Current	Capital	Current	Capital
TOTAL										

FACILITIES - FACULTY OF AGRICULTURE

	Description	Number	Rating	Needs
1. Classrooms				
2. Offices				
3. Farm				
4.				
5.				
6.				
7.				
8.				

EQUIPMENT & SUPPLIES - UG and FACULTY OF AGRICULTURE

Describe and rate the equipment and supplies in the FACULTY OF AGRICULTURE and UG (0=non/existent, 1=excellent, etc.)

Description	Number	Rating	Needs
1. Classroom equipment (desks, chairs, blackboard, e etc.)			
2. Office equipment			
3. Textbooks			
4. Laboratory equipment			
5. Audio/visual equipment			
6. Farm vehicles			
7. Seed, fertilizer, etc.			
8. Other agri-cultural tools & equipment			
9. Library books & journals			
10. Other			

UNIVERSITY OF GUYANA

Enrollment in Agriculture

1976-77	1977-78	1978-79	1979-80	1980-81

Projected Enrollments for the Next Five Years

1981-82 _____

1982-83 _____

1983-84 _____

1984-85 _____

1985-86 _____

(These, of course, are rough estimates/guesses. Ask several faculty members and administrators to characterize the student body in terms of background).

Client Group	
1. Urban family	
2. Landless (0-.9 acres)	
3. Small (1 - 9.9 acres)	
4. Medium (10 - 24.9 acres)	
5. Large (25 - 100 acres)	
6. Very large (over 100 acres)	

Client Group	
1. Non/Agricultural family	
2. Family involved in Estate Agri.	
3. Family are Rice Growers	
4. Family are Mixed Farmers	
5. Family are Livestock Producers	
6. Other	

OUTPUT AND PLACEMENT - UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

The FACULTY OF AGRICULTURE will graduate its first class this year. Therefore, there are no graduates. However, obtain estimates and judgements concerning future outputs and placements of students.

Projected per year production of graduates by specialities?

Where do you expect the graduates to be employed? What kind of positions. Government or private sector? Job titles and/or Civil Service rating?

PERSONNEL - UNIVERSITY OF GUYANA

Personnel by School Faculty and Degree

Faculty	Ph.D.	MA/MS	BA/BS	AS	Other
Agriculture					
.....					
.....					
.....					
.....					
.....					
.....					

NUMBER OF UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE FACULTY 1976-81, PROJECTED 1981-83

1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83

PERSONNEL OF THE FACULTY OF AGRICULTURE BY DEGREE AND AREA OF SPECIALIZATION

Area of specialization	Phd.	MA/MS	BA/Bs	Other
Horticulture				
Crop Science				
Soil Science				
Animal Science				
Plant Pathology				
Agr. Engineering				
Agr. Economics				
Rural Sociology/ Extension				
Other				

WHAT ARE THE NEEDS FOR TRAINING AND RETRAINING OF THE EXISTING FACULTY?

STATED PERSONNEL NEEDS - UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

Area of specialization	Ph.D.	MA/MS	BA/BS	Other
Horticulture				
Crop Science				
Animal Science				
Plant Pathology				
Agri. Engineering				
Agri. Economics				
Rural Sociology/Extension				
Other				

FACULTY SALARIES - UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

What is the current salary schedule? If possible get it for the last couple of years. Get it by rank, experience and/or degree. Get lowest, highest, increment, etc. for each rank etc.

How well does the current salary schedule compare with jobs either in the private sector, the other areas of Government, the corporations, etc. which require similar qualifications?

What is the level of satisfaction/dissatisfaction with the salary schedule?

What effect does the salary schedule have on the recruitment and retention of qualified faculty?

Other:

PROMOTION STRUCTURE - UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

Describe the system of promotion. Indicate problems with the system. Describe faculty satisfaction with the system.

PROFESSIONAL DEVELOPMENT - UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

1. What opportunities do faculty members have for further advanced training? Describe examples of advanced training in recent years.

2. Participation in Professional Organizations(domestic & international). Get specifics of recent participation: membership, meetings attended, etc..

3. Workshops, seminars, etc. held at UG-FA or in Guyana?

4. Opportunities for Research and Publication?

5. Other

6. Indicate level of satisfaction with opportunities for professional development.

LINKAGES AND NETWORK - UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

Describe the linkages and networks, both formal and informal, that the FACULTY OF AGRICULTURE has with other institutions, both in Guyana and internationally. Characte the linkages as being frequent (strong), occasional (moderate), infrequent (weak), assumed.

1. The Guyana School of Agriculture.

2. The Burnham School of Agriculture

3. Other Educational Institutions in Guyana

4. Ministry of Agriculture - Research

5. MOA / Extension

6. MOA - Other (specify)

7. GUYSUCO (Guyana Sugar Corp.)

8. GRB (Guyana Rice Board)

9. Lidco

10. Guyana Marketing Corp.

11. Guyana Pharmaceutical Corp.

12. Farmer Groups

13. U.W.I. - St. Augustine

14. Other foreign Universities (specify)

15. International professional organizations (specify)

16. Others

MAJOR STRENGHTS OF THE PROGRAMM AT UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

Focus on the following:

1. Faculty

2. Facilities

3. Course Offerings

4. Other

MAJOR PROBLEMS & WEAKNESSES -- UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE

Have the respondents describe the major problems and weaknesses. Ask specifically ab

the following:

1. Faculty with regards to numbers, training, disciplines. How many additional facul
   members do you need? What subject areas are particularly weak?

2. Curriculum

3. Facilities (buildings, etc.)

4. Equipment

5. Supplies

6. Budget

7. Other

SUGGESTIONS FOR IMPROVING THE PROGRAMM OF UNIVERSITY OF GUYANA/FACULTY OF AGRICULTURE:

Get as specific as possible. What might MOE do? MOA? What sort of international donor assistance might be given? What can the University do itself?

APPENDIX B

LIST OF PEOPLE CONTACTED DURING THE COURSE OF THE STUDY

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Ministry of Education

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Ministry of Agriculture

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Burnham Agricultural Institute

John Browman
Chief Agriculture Officer
Ministry of Crops & Livestock

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Ms. Giron
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Mohan V. Gosain
Education Training Officer
Guyana Sugar Corporation

Dr. Michael Granger
Soil Scientist
Ministry of Agriculture

John Halick
Chief of Party, Rice Project
IRI

Winston Headley
Marketing Manager
Guyana Timber Export Board

Oscar Henry
Chief Personnel Manager
Guyana Sugar Corporation

Oswald L. Henry
Assistant to Chairman
Guyana Sugar Corporation

Cecil Hepburn
General Manager
Timber Export Board

Clayton Hinds
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Noel Holder
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REPAHA

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REPAHA

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GUYSUCO

Motie Mangal
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GUYSUCO

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Ministry of Agriculture

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Ministry of Agriculture

Fritz McLean
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GUYSUCO

Gordon Mueller, Director
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Mon Repos

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Wagda L. Polland
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CARCOM Secretariat

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Mohan Ram
Statistical Officer, Planning Depart
Ministry of Agriculture

Naraine Ramsalhal
Plant Protection Specialist
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Dr. Herman Reid
Co-Project Manager and Principal
Animal Health Assistant

Thomas Rhodes
General Manager
Guyana Marketing Corporation

Singh Rompersaud
Graduate - GSA
Escort on Trip to MEA-ADA Abary
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Mabaruma, GUYSUCO

Dhan Paul Singh
Botanic Gardens
Station Director
Ministry of Agriculture

L. Van Sluytman
Minister of Hydraulics
Ministry of Agriculture

Jai Singh
Administrative Manager
Diamond Sugar Estate
GUYSUCO

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APPENDIX C

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APPENDIX D

PROPOSED CURRICULUM FOR UG/FA

In order to allow specialization by the faculty and students, the Dean has projected what he feels is an optimum organization of the UG/FA into departments, units and sections, as follows.

1. Future Curriculum and Research Responsibility

Until this point, there has been no research component in the UG/FA. The Dean, however, has proposed the following courses to be taught in the future, along with a statement of possible research responsibilities in the area as follows (note that many of the courses are already taught while a few are new):

a) Plant Breeding & Genetics

Courses: AG 300 Genetics
AG 304 Plant Breeding

Research: To organize and develop research in fundamental genetics and cytogenetics. To develop improved varieties of crop plants showing adaptability under Guyanese conditions (various regions) and possessing disease/pest resistance and other quality characteristics. Plant exploration in Guyana and in neighboring countries for collection of genetic stocks of cultivated and wild species.

To develop research on all aspects of seed technology for high quality seed and for fixing seed standards (assisted by crop production units).

b) Plant Physiology

Courses: AG 407 Plant Physiology

Research: To organize and develop research in nutrition, plant metabolism, physiology of production, environmental physiology and chemical regulation of growth in crop plants.

c) Agronomy

Courses: AG 401 Crop Husbandry (Agronomy)

Research: To develop improved techniques of crop production, weed control, soil and water management and cropping systems.

d) Horticulture & Fruit Technology

Courses: AG 403 Agricultural Engineering
AG 4.. Agricultural Engineering

Research: To study agricultural implements with a view to modifying or redesigning them to increase their efficiency, including design of processing plants, drying and storage structures and rural water supply. To develop new implements and test improved implements.

This unit would also supply the farm managers for the UG/FA Farm and for maintenance of the farm equipment and machinery.

f) Agricultural Zoology, Entomology and Nematology

Courses: AGR 100 Elements of Zoology
AG 303 Entomology
AG 307 Parasitology

Research: To develop research in fundamental and applied aspects of entomology with a view to devising effective methods of pest control, identification of insect pests and parasites. Research in economic zoology, including ornithology, conchology and aerology.

To develop research on taxonomy, morphology, physiology of plant parasitic nematodes, and on methods of controlling them, entomophilic nematology.

g) Agricultural Botany, Mycology, Plant Pathology & Weed Science

Courses: AGR 100 Elements of Botany
AGR 311 Plant Pathology and Mycology
AG 408 Weed Science

Research: To develop research on plant diseases caused by fungi bacteria, viruses and mycoplasms with a view to evolving suitable control measures.

h) Soil Science

Courses: AG 302 Soil Science
AG 306 Soil Science

Research: To study the soils in relation to their crop production capacity and investigation on soil conditions and manurial practices for increasing yields and crops.

i) Agricultural Biochemistry

Courses: AG 400 Agricultural Biochemistry

Research: To develop research on fundamental and applied aspects and amino acids from unconventional sources.

j) Agricultural Microbiology

Courses: AG 310 Agricultural Microbiology

Research: To study the physiology and biology of soil microorganisms to evaluate the efficiency of nitrogen fixing ability of bacteria/algal strains, to isolate and maintain cultures of microorganisms useful to agriculture.

k) Agricultural Chemicals

Courses: AG 408 Agricultural Chemicals

Research: To develop research on development and other aspects of agricultural chemicals, viz. pesticides, fungicides, adjuvants etc., particularly from indigenous raw materials; safety aspects of the use of pesticides; residue analysis.

l) Animal Breeding

Courses: AG 308 Animal Breeding

Research: Application of genetics to cattle, sheep and goat, swine, and poultry breeding programs.

m) Animal Physiology & Nutrition

Courses: AG 404 Animal Physiology and Nutrition

Research: To study nutrition problems and feeds for cattle, swine, sheep and goats, and poultry.

n) Animal Production and Management

Courses: AG 405 Animal Husbandry
AG 406 Animal Husbandry

Research: To study adaptability, feeding, care and management cattle, swine, sheep and goats and poultry.

o) Agricultural Economics

Courses: AG 301 Agricultural Economics
AG 305 Agricultural Economics

Research: Research in farm management and production economics, agricultural marketing and prices, agricultural finance and cooperation and agricultural econometrics.

p) Agricultural Extension Education

Courses: AG 309 Agricultural Extension Education

Research: Studies on extension teaching methods and audio/visual process and media of agricultural communications; women and child welfare in rural development; rural community organization and leadership; rural home management; methods of social research and evaluation.

q) Agricultural Statistics

Courses: MTH 151 Mathematics
AG 409 Statistics and Design of Experiments

Research: Research on sampling techniques and design of experiments.

2. Future Facility, Equipment and Supply Needs

On campus, there will be a future need for the UG/FA to have its own buildings, or suite of facilities, along with appropriate supplies and equipment. The Dean has projected needs along these lines in Table 2.

3. A UG/FA Farm

If research by the Faculty and demonstration and farm practical experience for the students is to be accomplished, it would be desirable to develop a UG/FA Farm. As already mentioned, 100 acres are said to be available adjacent to the main campus. However, location of the UG/FA Farm will have to be determined first.

4. Miscellaneous Suggestions Made by the Dean

The Dean had further miscellaneous suggestions for improvement of the UG/FA as follows:

Ministry of Education

- release of agricultural teachers to join the UG/FA as students
- interaction with agricultural teachers and faculty of UG/FA

Ministry of Agriculture

- joint research/extension projects
- faculty could be drawn upon by the Ministry for research/extension as and when necessary/possible
- Ministry staff, particularly those who have a second degree, could be drawn upon by the UG/FA to teach

International Donors

- assist in construction of buildings, supply of equipment, reprints of journals
- assist in bilateral projects
  - for graduate students - for course work
  - short-term exchange visit programs for senior staff
  - assist in participation of workshop, seminars, conferences, etc.

University

- expedite recruitments
- expedite construction of buildings
- expedite building up farm facilities
- build some residential quarters

APPENDIX E

SUGGESTED ASSISTANCE PROJECTS

During the course of this study, the question was often raised concerning how international donors might assist Guyana in strengthening its REE system. Many of the respondents offered suggestions for specific projects which they thought would benefit their particular programs. Discussions during meetings of the Steering Committee focused on projects which would benefit the REE system in general and contribute to the overall development of the agricultural sector. Dozens of good and worthy projects were suggested. Not all of them can be supported at the present time. The problem became to identify one or two possible projects which could have the greatest impact. The SECID/Tuskegee team listened to the various suggestions and points of view and weighed them in terms of the findings of the study. The team concluded that two specific projects would best address the current weaknesses of the REE system.

The first would be a project to strengthen the Faculty of Agriculture at the University of Guyana. It was felt that such a project would be a sound approach for dealing with the current shortage of trained personnel in agriculture. It would provide Guyana with the capability for training much of the needed professional-level personnel to staff the numerous vacant positions which currently exist in the sector.

The second project would support the establishment of an Agricultural Services Corporation to provide research and extension functions for the agricultural sector. Such an organization would allow for the integration of the currently fragmented system and would provide a mechanism for dealing with the problem of salary differentials between Public Service and State Corporation personnel.

The proposed projects are large and probably would require the participation of several donors. More importantly, they would require a major commitment of resources and personnel by the Government of Guyana. Unless the Government of Guyana is willing to make these commitments, these proposed projects would have little chance of success.

Project 1---Development of the University of Guyana--Faculty of Agriculture

The University of Guyana is the only university-level institution in the country. The Faculty of Agriculture was added in 1977. At the time, there was general consensus that Guyana needed to establish its own institution to train students at the BSc and MSc levels in agriculture. Up to that time, the strategy had been to sponsor students abroad

for this training. There were two major weaknesses with the foreign training approach. First of all, the climates and agricultural production systems at the foreign universities were quite different from those in Guyana and consequently, much of the training provided has not been directly relevant to Guyanese agriculture. Secondly, the Government of Guyana has experienced great difficulty in getting many of the sponsored students to return to Guyana after their training. Many of the sponsored students have felt that employment opportunities were better outside of Guyana and have elected not to return home. The Faculty of Agriculture was established to deal with these problems.

Unfortunately, the Government of Guyana has not been able to devote the necessary resources and personnel to the Faculty of Agriculture required to make it a viable program. At the present time, the Faculty has only a couple of regular faculty members and lacks its own facilities. It is dependent on the Guyana School of Agriculture and other Faculties at the University to provide much of the training for its students and for its facilities. The current program cannot contribute significantly to solving the manpower problem in Guyana. It has the capacity to train only a small fraction of the personnel needed. More importantly, it lacks both the facilities and the faculty to provide training of sufficient quality. If the Faculty of Agriculture is to make an important contribution to the development of agriculture in Guyana, it must be significantly strengthened. The Government of Guyana, with the assistance of international donors, must upgrade the faculty, strengthen the curriculum, and expand the facilities.

The strengthening of the Faculty of Agriculture will require a multidimensional project. The most important aspect must the upgrading of the faculty, both in numbers and qualifications. However, it must also address the problems of curriculum and facilities. The major components of the project should be:

1. Development of a clearly defined role for the Faculty of Agriculture relative to the Guyana School of Agriculture.

2. Construction of a facility for the Faculty either at the Turkeyen campus or at Mon Repos.

3. Development of a school farm.

4. Commitment of funds by the Government of Guyana for recurrent costs and selected capital expenditures.

5. Expansion of the faculty and staff to levels necessary for a quality university-level program in agriculture.

6. The provision for expatriate faculty until adequate Guyanese faculty is trained.

7. Faculty training at the MSc and Ph.D levels at foreign universities.

8. Technical assistance in curriculum development.

9. Procurement of textbooks, laboratory equipment, farm equipment and other necessary commodities.

10. Provision for library books, journals and related materials.

The project would fit well into the Title XII collaborative framework. One or more Title XII institutions could develop a collaborative arrangement with the University of Guyana and provide the necessary technical assistance and training. The Title XII mechanism could provide for a continuing relationship between institutions after the proposed project has ended.

Expected Outputs

1. Increased numbers of BSc and MSc level UG/FA graduates to fill existing and expected vacancies in the agricultural sector of Guyana.

2. A curriculum designed to meet the specific needs of Guyanese agriculture.

3. A trained university-level faculty in agriculture.

4. Adequate facilities for university-level training in agriculture.

Inputs required

1. 20 - 40 person-years of technical assistance in the form of expatriate faculty for the university.

2. 40 - 80 person years of training at the MSc and Ph.D levels for UG/FA faculty at foreign universities.

3. Construction of a facilty for UG/FA.

4. Laboratory, classroom and related equipment.

5. Library books, journals, and related materials.

6. An adequate recurrent budget for UG/FA.

The proposed project would probably cost in the range of US$ 8,000,000 to US$ 20,000,000. The project cost would depend on the size on the facility constructed, the number of expatriates utilized, and the number of Guyanese faculty trained. The length of the project should be at least five years.

The proposed project fits well with the current USAID strategy for assistance to Guyana. The FY81 CDSS emphasizes institution building and specifically mentions education. The Government of Guyana has also evidenced support for such a project by establishing UG/FA. In recent years, it has been actively seeking support for UG/FA from the international donor community.

Project 2---Development of the Agricultural Services Corporation

Agricultural research and extension in Guyana is currently fragmented. There is no overall planning for or administration of these activities. Consequently, there is both much duplication of effort and important segments of the agricultural sector not being serviced. There is a shortage of trained professional personnel and the various research and extension organizations are in competition for the limited supply. Significant salary differentials have developed between the State Corporations and the Ministry of Agriculture.

The proposed project would fund the establishment of a new organization which could service the various Ministries and State Corporations involved in agriculture. This would have the following advantages:

1. A new organization could be given jurisdiction and authority across existing organizations. Current research and extension organizations are limited to specific Ministries, Divisions and State Corporations. This will allow for a comprehensive approach to agricultural research and extension.

2. The proposed organization would solve the problem of differentials in salaries between the various research and extension units. The proposed corporation would remove all research and extension personnel from the domain of the Public Service.

3. The proposed organization would allow for the development of a national plan for agricultural development. The current research and extension effort is primarily restricted to the coastal areas.

The establishment of the Agricultural Service Corporation will necessitate major reorganization by the Ministry of Agriculture and financial support by international donors. It will involve the reorganization of existing personnel and resources, the funding of facilities and equipment and the training of additional personnel. The major components of the project should be:

1. The integration of existing research and extension units into the Agricultural Service Corporation.

2. The development of research and extension groups to work on the agricultural commodities which are important to Guyanese agriculture.

3. The development of technical packages for each of the major agricultural commodities which can be easily extended to Guyanese farmers.

4. The expansion of the number of professional personnel involved in agricultural research and extension.

5. The establishment of a well-staffed and equipped system of research stations throughout the country.

The proposed project will require a great deal of technical assistance from expatriate research scientists and extension specialists. The Title XII collaborative arrangement would be a good mechanism for this assistance. It would offer the participation of qualified scientists in the research efforts in Guyana and promote long-term relationships between Guyanese and American institutions.

Expected Outputs

1. A comprehensive national program for agricultural research and extension.

2. A significantly larger number of trained research and extension personnel.

3. Technical packages for all important agricultural commodities.

4. Qualitatively and quantitatively better service to Guyanese producers.

5. A national system of research stations.

6. Improved research facilities.

Inputs Required

1. 20 to 40 person-years of technical assistance in the form of expatriate researchers and extension specialists.

2. 20 to 50 person-years of training at the MSc and Ph.D levels for Guyanese researchers and extension personnel.

3. Scientific equipment and supplies.

4. Extension equipment.

5. Transportation equipment (landrovers, boats with motors, motor bikes, etc.)

6. Renovation of research facilities and offices for extension personnel.

7. An adequate budget for recurrent costs.

The proposed project would probably cost between US$ 5,000,000 and US$ 10,000,000. The length of the project should be at least five years.

This project is consistent with the present USAID strategy for development assistance to Guyana. The FY81 CDSS emphasized institution building as the best approach to developing Guyanese agriculture. The establishment of an organization devoted to a comprehensive approach to extension and research would certainly be institution-building. During discussions in the Baseline Study Steering Committee, the suggestion that a single research and extension unit be created was discussed. There appeared to be significant support for the idea.